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OF THE  
**ASIATIC SOCIETY**  
OF  
**BENGAL.**

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THE SECRETARY.

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**PART II.—JULY TO DECEMBER, 1845.**

**Nos. 163 to 168.**

**NEW SERIES.**



"It will flourish, if naturalists, chemists, antiquaries, philologists, and men of science, in different parts of Asia will commit their observations to writing, and send them to the Asiatic Society, in Calcutta; it will languish if such communications shall be long intermitted; and will die away if they shall entirely cease."—SIR WM. JONES.

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# JOURNAL

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## ASIATIC SOCIETY.

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*Notes on the Pokree and Dhanpoor Copper Mines in Gherwal. By*  
SIEGMUND RECKENDORF, Esq., *Mining Engineer.*

After the commissioner, Mr. Lushington's report, Vol. XII. Journ. As. Soc. 1843, little remains to be said about the situation of these mines. Pokree is on the right, Dhanpoor on the left side of the Douliganga, both about six miles horizontal distance from the river, and twelve miles between themselves. From Pokree I saw Dhanpoor distinctly, and it appeared about 1,000 to 1,500 feet higher situated. Putting the compass in h. 17 or hs. ( $15^{\circ}$  E. to S. or  $15^{\circ}$  W. to N.) I had on the bearing—therefore in one line—on one side the Rajah's mine, and (according to the statement of the people,) several places where the same talcose slate occurs as in the Pokree mine. On the other side, I had a place, called Deehoor, on the road to the valley of the Gunga; and on the Dhanpoor side a place little below the village, both places containing the slate. The layer of talcose slate containing the copper ore is therefore a very extensive one, and there is every reason to believe, that the copper goes as far as the slate, and the slate as far as the formation, to which I consider the slate to belong. Indeed it requires very little attention from an eye, practised in researches after minerals, to see that the whole of the known copper mines from the Nepal teraee in the east, till beyond the Pokree mine in the west, are only parts of one layer of not very great thickness, which perhaps may have been subdivided in two or three thinner layers, by some other oreless layers of slate or limestone

now transformed into Dolomite. In a country where mining is more in use and better known than in India, lakhs of rupees would have been spent upon feebler indications of ores than are here seen. When I was at Pokree there was no work going on, but two or three native women washing old heaps of nearly exhausted rubbish. The "Khans" were nearly entirely broken down—that in which Mr. Wilkin put in timber, was yet open for about forty yards, but in all these very slight indications of ore, copper pyrites and blue and green carbonate. Since many hundreds or thousands of years that part of the layer has been alternately exposed to the access of air and water, and accordingly the copper pyrites has been transformed into sulphate of copper, which is dissolved and carried off by water. That process is going on still, the waters containing enough sulphate of copper to cause, by aid of Hanuman or some other old gentleman, the great wonder of metamorphizing—*i. e.* covering—iron nails, thrown into the water with copper. The natives showed me two of these nails as perfect miracles.

It was in this part of the layer where not only the native rulers worked, but also Mr. Wilkin. The slate in it is soft like soap, and very little ore remained, partly as pyrites, partly in sulphate, partly as blue or green carbonate of copper. From Mr. Wilkin's bad success no conclusions ought to be made, or can be made. An experiment on ore from Chili or Kamtschatka would be as decisive for the riches of Pokree mine as Mr. Wilkin's was, and when I heard that a "*sahablok*" worked  $2\frac{1}{2}$  years at Pokree I could scarcely believe it. But I admired Mr. Wilkin's proceedings, when I saw, from Mr. Lushington's report, the means Mr. Wilkin had at his disposal, and the object of his labour. I then acquitted Mr. Wilkin of every fault of which I had accused him in my mind when I saw that, with a sum scarcely sufficient to open the spot where the ore can be hoped for and collect materials for buildings, he had to decide upon the riches of *a mine at first to be created*. The layer dips in h. 23 ( $15^{\circ}$  N. to E.). The work to be commenced was, a gallery 30 or 40 fathoms below the old mines; and not the excavation of ores which are a very good addition in smelting better ones, but the smelting of which never would pay. If left to his own judgment, and having the whole sum at disposition, Mr. Wilkin probably would not have produced any ore in the first year and a half, at the end of which he would most probably have been able to show such

specimens of ore as would extinguish every doubt on the richness of the mine; then, and not before then, was the time to begin experiments; but also these ought to have been made in another way. Mr. Wilkin could not prepare the ore on hearths and with sieves, as undoubtedly he would have done, had there been more money at his command. Furnaces on a scientific system instead of the rough native hearths ought to be made, and these with powerful bellows put in regular motion by water-wheels instead of two goat skins moved by hand. In such fire-hearths, I saw in Dhanpoor two meltings, each continued through about four hours, and from beginning to end the flames (4 to 5 feet high, and 3 to 5 feet diameter) were perfectly green from loss of metal. The natives told me that such was the case in Pokree also! This shows that,

1. The necessary preparations before the smelting could not be made.
2. That the smelting was not properly conducted, the loss being too great.\*
3. That the ore used was not the ore which would be the object of mining on a large scale, it being impoverished by the slow metamorphosis of pyrites into sulphate of copper.

It must be confessed, that the Pokree mines are highly wronged by the conclusions made from results shown by any work done till now. It could be objected against p. 3, that the presence of better ore or richer ore, is only a supposition; but it is not so! I found in the Pokree bungalow a piece of hard rock talcose slate—with a high coloured pyrites of copper, taken *from the end* of Mr. Wilkin's "Khan." The ore was from a place where either no water came, or where it stood constantly; but all the pyrites *from the first 30 or 40 yards* had—so said the natives—a greyish-watery colour. This shows that ore in the bowels of the mountain is better preserved than on, or near the outside; consequently more ore must be there, for it cannot be supposed that an ore which for so many miles continues, and has so little thickness, should not go, with the layer in which it occurs, to a considerable depth at least. Analogy with thousands of cases leads to the supposi-

\* In a high furnace a large quantity of metal offers a nearly as little surface to the wind as a small one. In a high furnace the ore is only exposed to the stream of wind at the moment of melting, but in a hearth both ore and metal are constantly exposed.

tion mentioned, that in Pokree and its neighbourhood vast quantities of copper could, with advantage, be produced. And upon observation of analogies and anomalies in nature, hundreds of valuable rules are founded, and most of sciences based.

Assisted by these rules *mining is no lottery*, and not more hazardous than agriculture and manufactures.

I come now to other objections made to these mines,—1. The distance from Pokree to Almorah is *perhaps* one day's march farther than Almorah from the plains, to a point where several days' land-carriage for the metal from the river is required. Sreenugur is yet nearer than Almorah, and even Hurdwar can easily be reached from Sreenugur, by little flat boats steered by one man, loaded with a sufficient quantity of metal. The boats should be of a light construction, and would *as wood only* sell very well.—2. Articles of bulk are, for the beginning, not required, and should mining *become modern* in the Himmalayas, roads (which however in these parts are not so very bad, as not to be passable, after very little repair, by mules, horses, and even by elephants,) will soon be made; and in a later period larger articles certainly will be manufactured *in the hills*. Iron ore is plentiful there.

3.—The English copper is cheaper, because it is worse than the native copper. The natives in Sreenugur, Teeree, Hurdwar, etc., told me, they would not use the English wrought copper, but for the great size of the plates. For smaller work they prefer Dhanpoor copper. If the lessee had any difficulty in selling the metal at two rupees, he could easily give it cheaper; but his stores are always so small, that he is sure to sell even at the higher price. From cross-examination of his mookteear, and the miners and smelters, I calculated his profits at thirty per cent., and from the unwillingness of the first to tell me more, I had reason to think that my calculation was right. I told him so, and the result of my reckoning, and how I obtained the data without the reporter's knowing it. When I had left Dhanpoor, my servant told me that the mookteear abused the work people for their betraying him, and the people were quite astonished to hear they had done so. The Commissioner, Mr. Lushington, states the way in which the charcoal burners are going on. They will cease to do this if they hear that from the trees themselves better charcoal can be obtained than from the mere branches, and should they continue the work, nothing remains for the lessee but to send



his own coal-burners for working up such wood as remained from the other burners, saving thus the outlay for cutting down the trees. The lessee would have always charcoal enough, even for a large establishment, or several of them, for if the inhabitants see they can obtain a constant livelihood they will take care not to waste wood. Provision however for the renewal of the forest must always be made for the sake of future cheapness. I think too labor could be obtained cheaper than in England, even if the greater skill and bodily strength and good-will of European workmen is taken in account. The old smelter in Dhanpoor may be compared with the most skilful smelters any where. I believe now to have shown the possibility (and probability) of turning to advantage the riches of Pokree; the copper could support the concurrence of the English copper in the lower hills and part of the plains, and would have advantages over it, in the higher interior, and in such places at the foot of the hills where the English product cannot reach by mere water carriage.

The Dhanpoor mines, or holes, are worked to advantage, and no doubt could be made more so; but perhaps it would take more trouble to find the layer of copper than in Pokree. What till now is opened would under European superintendence be entirely exhausted in the course of one year or two. It is possible the layer may turn out to be a regular dyke, but I suppose it will not be so, but might be cut off by slate at no very great depth. The working on a large scale would be also more expensive in Dhanpoor than in Pokree, for the ore must be stamped, and washed on *moving hearths*. However, I will not say, that Dhanpoor mine could not be made, by continued labor, a very rich one. The situation of Dobri mine on the other side of the very same hill range, admits no doubt of the ore's extension; moreover the steepness of Dhanpoor hill admits shorter galleries and to greater depth. The present mine could not of course be of any use. There are galleries of several fathoms in height and breadth, following upon and preceded by others, which are so low and narrow, as to admit only children; and the slope goes downwards, then up again for a few yards, now to the right, then to the left; &c. A shaft in the mine is only passable for those who do not mind going about in the dress of Adam on the first day of creation, for only the adhesion of the skin to the nearly

polished rock, keeps the passenger in many places from falling down. The tools are only a chisel and a hammer ; blasting of course ought to be introduced.

From what is above said, it will appear as my conviction, that in the copper mines of Pokree and Dhanpoor, capital could most advantageously be employed. But it is not Government, in my opinion, who should work there. The best writers on national economy agree, that such speculations do not thrive in the hands of a Government. If Government would give these mines to any private individual or company, for as long a period as they pay regularly a certain duty from the produce, and would allow to any one else to begin mining wherever he could find an ore, in a very short time, certainly, many places where ore is known, would be taken up, and the revenues of Government, now derived from the mines, would be very considerably increased. Districts, now nearly empty of population, void of cultivation, useless to the treasury, would yield revenue, and the population would become acquainted not alone with European luxury, but with European skill and intelligence, which would be at first more useful than schools and missionary establishments. As the agriculturist prepares by ploughing the hard soil for the reception of the seed, so we may consider, the becoming acquainted with the advanced state of European arts would “ plough” the *Paharri’s* mind for the acceptance of higher objects, which they might be thought fit for being taught in some future time.

And did not nature show her intention of civilizing the inhabitants of these wild districts through mining, by her upheaving such mineral riches which, in their present state of civilization, they cannot appreciate ?

With regard to the capital required for the opening of Pokree mine and Dhanpoor mine, I think 40 to 50,000 rupees would be more than sufficient for both establishments, on a footing equal to the advantages which can be expected in the first result of an operation, which may be carried on through hundreds of years.

*Calcutta, September, 1845.*

*Report of an Expedition into the Mishmee Hills to the north-east of Sudyah. By Lieutenant E. A. ROWLATT, 21st Regt. N. I. In a letter to Major F. JENKINS, Governor General's Agent, N. E. Frontier, dated Saikwah, 1st January 1845. Communicated by the Government of India.*

I now do myself the pleasure of forwarding to you an account of the expedition from which I have just returned, and at the same time beg to submit a map of the country through which I passed, to this I have added some portion of the country more to the north than to where I penetrated, and which is therefore merely laid down from descriptions gathered from the Mishmees who have visited those parts.

On Thursday, the 21st of November last, I quitted the port of Saikwah by water, and on the following day being joined by two Sudyah Beekhyahs, Deena Hazaree and Baleah Boca, who were to accompany me during the trip. At the mouth of the Koondil river, where I had remained the night, we took our final departure, myself in a small khail boat, and the rest of my party in the small fishing boats of the country, which, for the sake of ascending the rapids of the Burhampooter, are made particularly light and handy.

As it was our first day, we were not able to start very early; and I found that the evening was drawing to a close before we had long passed the mouth of the Tainga-panee. Up to this point the stream continues pretty tranquil, although a perceptible difference is observable in the rate at which it flows; and as from this point upwards the banks and islands are almost entirely formed of stones\* washed down from the mountains, the water from hence is most beautifully clear and transparent.

Nov. 23rd.—In pursuance with the directions I had given the previous evening, the boats moved off by sunrise, and by 9 A.M. we reached the Khamptee village of the Kaptan Gohain at Choonpoora, where I stopped for a short time, and again moving forward, arrived by the evening within a short distance of the mouth of the Dhollee river, which I got to early the next morning. Being anxious to see a copper Tem-

\* These pebbles and boulders are all of limestone, and furnish all the lime used in the public works in Upper Assam. The limestone is a grey crystalized rock just exactly the same as the marble used as flags in the Government House. I have never seen it in situ.—F. J.

ple that is situated on a branch of this stream called the Sutrung, I ascended the river in the smaller boats, and finding that the water in the Sutrung was only a few inches deep, I was obliged to wade up this stream; but from the jungle having become excessively dense, and having no person with me who knew exactly the position of the Temple, I was obliged to give up the attempt and return to the mouth of the river, unsuccessful and disappointed.

The erection of this building is ascribed to a demi-god, named Pura-houtan, who, falling in love with the goddess Khaisa Kattee, undertook at her commands to build her a temple in the space of one night, which if he succeeded in completing he was to obtain her hand in marriage, but failing in his task was to give himself up to be devoured by her. On these terms, Purahoutan commenced his undertaking, and had completed the Temple with the exception of the doors, when the sun being made to rise before its time he was obliged to fly to the woods; but, being soon after overtaken by his beloved, was then and there devoured as a morning repast.

The Temple\* is called the Tama-suree, being partly made of copper; and at so late a period as a little upwards of twenty years ago, two human beings were sacrificed yearly at her shrine to propitiate the good auspices of this sanguinary goddess. Near the mouth of the Dhollee are yet visible the remains of the residence of the Chutteeah Rajas, whose rule is said to have extended over the whole valley of Assam as far as Gawalpara, but which was terminated by the invasion of the Ahoms, who crossed the hills from Moonkong.

*Nov. 25th.*—As we had now fairly got into the rapids of the Burhampooter, where it was necessary for the boatmen to be constantly in the water, I stopped to cook before setting off, as the weather being cold the men did not like wading, until they had fortified themselves with some food. I managed, however, to get off by 8 o'clock, and before midday had passed the mouths of the Khairam and Degoroo rivers. The banks of the Burhampooter are here principally wooded with the

\* A remnant of the priests of this Temple, who call themselves Dolyes, have lately come to Lieut. Dalton's notice at Luckimpoor. They are of Chooteeah origin: they boast of the human sacrifices, and say the discontinuance of them has been the cause of all the misfortunes of Assam. Lieut. Dalton promises some particulars of these Chooteeahs, the last great race who held possession of the north bank of Upper Assam at an early date.—F. J.

Sissoo tree, intermixed with Hallecks which, from the beautiful red flower that blossoms on it at this time of year, imparts quite an autumnal tint to the landscape.

This day the patches of cultivation in the hills became quite apparent, and the landslips on some of the mountains appeared of such magnitude that the fact of a village being occasionally swept away ought not to be wondered at, and I was told that the village of Macrusu was so destroyed last year, and that many of its inhabitants together with the chief of the village were involved in the destruction. By evening we arrived at the mouth of the Sidroo, where we remained the night.

*Nov. 26th.*—From this point the river becomes a succession of rapids, so that during the day our progress was but slow. The scenery is, however, very magnificent, and the river abounds with a great variety of the best sorts of fish, amongst which I mention the Silghurreah, Boca, Maikhan, Liun, Sandoees, Advée, &c. &c., which when fresh caught are most delicious eating.

At the foot of one of the hills that approaches the Burhampooter at this part, is observable a high white cliff, which the traditions of the natives affirm to be the remains of the marriage feast of Raja Sisopal with the daughter of a neighbouring king, named Bhisamak; but she (Rookmunee) being stolen away by Krishna before the ceremony was completed, the whole of the viands were left uneaten, and have since become consolidated into their present form.

As we had now arrived within a short distance of the Khamptee village inhabited by the sons of the Rannah and Jow Gohains, I sent in some of my people to inform them of my arrival, and in the mean time made as much progress in the boats as the nature of the stream would allow, but found that the current was too rapid to admit of my reaching the mouth of the Dura river; a short distance from which I therefore remained for the night.

*November 27th.*—About 10 o'clock this morning, the party I had despatched to give information of my arrival made their appearance, bringing with them the sons of the Rannah and Jow Gohains, together with several Mishmee chiefs, and a numerous train of followers both Khamptee and Mishmee, when all were assembled and a conference took place. It was arranged, that I should proceed into the hills guided by these Khamptee chiefs, who appearing to possess a good deal of

influence over these Mishmees, I was glad to accept of their escort. I therefore left my boats, and after passing over three or four miles of pebbly beach that lines the banks of the Burhampooter (or Lohit as it is usually called by the people in this part), I reached the road which, leading through the jungle that intervenes between the river and the hills, ascended up to the village which is situated a short distance up the acclivity on a level piece of ground well adapted for such a purpose. The village of these Khampteas consists of fifteen houses, and is placed on a spot of ground that some years ago was the site occupied by the Mishmees, who then called it Maboling, and is watered by a small hill stream named the Toolooah. Their cultivation, which is rather extensive, is scattered around the village, both on the side of the hill and in the plain beneath. This position has now been occupied by these people for the last three years, and in consequence of the protection they afford to the Mishmee tribes in this quarter from the inroads of the Chullee Cuttia and Myjoo Mishmees, a great many of the more influential chiefs, amongst whom I may more particularly mention Prum Song, the head of the Muroo tribe, have settled in their neighbourhood which, being much more productive than the hills in the interior and nearer to the plains, with which they are anxious to extend their trade, they find it much to their advantage to cultivate the goodwill of these Khamptee chiefs; for, should these Khampteas remove from this place, the whole of the Mishmees who have settled in their vicinity must again flee to the sterile mountains beyond the river Tiding, and forego all the advantages of trade, which from their proximity to Assam they are at present enabled to prosecute with considerable gain to themselves. During my stay in this village I ascertained the height at which the Burhampooter issues from the hills, to be 2049 feet above the level of the sea.

By the 3rd December all arrangements having been completed, and the necessary number of people collected to carry the baggage, I left the Khamptee village, and again passing down the descent entered on the stony beds of the Burhampooter; over these we passed for some miles, and found the passage along them any thing but pleasant walking. On arriving at the mouth of the Damai river we ascended that stream, and by evening had reached the path that leads up the first range of mountains. On producing my store of beads, salt, &c., I found that half a

rupee's worth of these articles was demanded for every day's work, and as I could not have proceeded without the assistance of the Mishmees, I was obliged to agree to their very exorbitant demands.

On the morning of the 4th, after a hasty meal had been despatched, and the several loads adjusted, we quitted the spot we had occupied during the night, and for some time ascended and descended the small hills that line the banks of the Damai. After an hour or two we arrived at the foot of the large range that bounds the view from the plains; the ascent was rather abrupt, and the path but a bare track up the face of the mountain. By midday we reached a small level piece of ground, where a little water was procurable; and as the mountain air seemed to sharpen our appetites, a few eatables that we had with us were devoured with great gusto.

By 4 P.M. we reached the summit, from which a splendid view of the plains and the surrounding hills is visible: on the right are seen the towering mass of immense mountains that form the country of the Myjoo Mishmees; and in the plain beneath, the prospect is only bounded by the far distant horizon, within whose limits the endless sea of forest that characterises this part of Assam is the only object that meets the eye. From this point we again descended for a couple of hours, and as the evening was drawing to a close, arrived at a small hill rivulet where, as water is the principal requisite to be sought for in a place for encamping, I determined to spend the night, although nothing but the stony bed of the stream was available to rest on. The weather being cold we found our night's repose rather uncomfortable, and were glad when the morning broke to arise and set about procuring some breakfast: this being soon accomplished we again set out, but found the road worse than the previous day, as it led over numerous landslips that in this part are met with on every slope; part was therefore over broken ground, and every now and then we had to pass onward by means of single trees that had accidentally fallen across the chasms that intersected the path. As the greater part of this day's march was descending the mountain we had ascended the day before, and the road improving as we advanced, by 12 o'clock we entered on the scattered cultivation of Saloomgoom, from which the Burhampooter is distinctly visible winding its tortuous way around the foot of the hills beneath. As we approached the village, here and there the houses of the Mishmees became apparent, and as



it is the custom of these people to build separately on the land they cultivate, a village is spread over a large space, although confined to a few habitations. On reaching the house of the Gam Abasong, I found that the whole of his people were employed in making preparations for the reception of myself and party, and doing all they could to make us welcome.

By 10 A.M. of the 6th we left this village, and there being a scarcity of people to carry the baggage, I here deposited every thing that it was possible to dispense with: after passing some cultivation the road led down by a steep descent to the banks of the Tiding river; some distance up this stream a large number of Mishmees, principally of the Malo and Moree clans, are located, who cannot be reckoned at less than a thousand persons. As the river was low, we crossed over by means of the fishing weirs, which extend across the stream; but the usual method adopted by the Mishmees themselves, is by fixing a hoop of cane round the waist, which, passing over a single rope of the same material stretched from bank to bank, enables them to propel themselves forward with their hands and feet, and whatever articles they may have with them are suspended to the bottom of the hoop: in a similar manner both cows and buffaloes are conveyed from bank to bank, being dragged over by other ropes attached to the hoops in which they are carried.

In the bed of this river are to be found a great variety of the different primitive rocks: lime is here met with in immense blocks, and granite, serpentine, &c. with numerous metalliferous stones, are mixed together in the greatest profusion. On leaving the bed of the Tiding, the road leads over the spurs of the mountains that continue down to the banks of the Burhampooter, and for some distance passes under the perpendicular cliffs of primitive limestone, from which are visible the pendulous stalactites that are peculiar to this formation; after passing the limits occupied by this rock the soil becomes micacious, and in a few places I observed mica slate to cross out from the surface. Arriving on the banks of the Burhampooter, the only path was from block to block, which being of great size and worn to a smooth surface from the action of the water, the passage over them was thereby rendered both arduous and difficult.

The mountains in this neighbourhood are mostly covered with dense tree jungle, of great magnitude, for about two-thirds of their height, above which is grass, and near the summits bare rock; and in the dells

between the mountains, small hill streams, of beautifully clear water, flow along the hollows until lost in the large rivers that intersect the country. By sunset we reached a Mishmee house, and were glad to avail ourselves of the shelter offered.

*Dec. 7th.*—As rain had continued falling during the night and the greater part of the day, I was unable to proceed further than a few miles; but contrived to reach the house of a chief, named Heasong, to whose residence most of my baggage had been taken on by mistake the previous day.

*Dec. 8th.*—On leaving this place, and passing through much low jungle where formerly cultivation had been very extensive, we reached the Loolooah rivulet, and crossing which the road lay skirting the banks of the Burhampooter, to the bed of which we occasionally descended; for the most part the road for these hill tracks was tolerably good, except one place that ran along the side of a low rocky mountain where the footing was unsafe and precarious, from which had any one fallen, he would have been precipitated some thousand feet into the boiling stream of the Burhampooter, the noise of whose waters was just audible from the height we were passing. During this day's march we passed by an elevated lake of small extent, as well as many streams of minor size, and by 4 P.M. arrived at the house of Rumling, who is the head chief of the Taen tribe of Mishmees, and has established himself near the Pass leading from the country to the south of the Burhampooter, which being inhabited by the Myjoo Mishmees, with whom the tribes to the north of the river are at war, affords thereby a protection against the inroads of these people. As a large pig had been slain by this chief in honor of our coming, a part of which is usually reserved for the inmates of the house, I was much amused to see the manner in which these people cook and feed themselves. The animal being killed the blood is all carefully collected, and with the grain babosa is made into a kind of black pudding; the meat is boiled in a large chaldron, and being cut up into pieces is distributed in leaves amongst those in the house; these pieces being taken up in the hand are forced as far as possible into the mouth, and the remainder cut off close to the lips: when this is disposed of, the mixture of babosa and blood is stuffed down their throats as fast as they are able to swallow it. In this manner their meals are completed in a few minutes, when they

again take to their pipes, which are seldom out of their mouths from morning to night. Many of the cooking utensils used by these people are made of stone; but they also possess some of copper, which are brought over from the Lama country; in these they boil their water, cook their victuals, and make the liquor of which they consume large quantities; but as it is drunk in an unfermented state, and therefore is of little strength, a great many quarts are necessary to produce the slightest intoxication.

As I was informed by this chief that some people of the Lama country were at a village some distance further on, I determined to proceed to the place they were remaining at, and sent forward a messenger to inform them of my intention. It was therefore the morning of the 11th December before I quitted this chief's house, and after proceeding some distance we arrived at the Dillee river, which is a stream of considerable size, having its rise in the snowy range bordering the Lama country, along whose banks a path to that country exists. After crossing this river we proceeded along the verge of the Burhampooter, and by 4 p. m. reached the mouth of the Doo river, which, although a stream of some magnitude, is yet much inferior in size to the Dillee, and rises also in the same range of mountains as that river, a little more to the eastward, and is one of the routes by which the trade with the Lama people is carried on. From this point the Burhampooter has a southeasterly direction, and, winding between the mountains, passes through the snowy range beyond which the valley of Lama is situated. By the route of the Dillee river the road leads out at the village of Glee, and by the Doo at that of Lamai in whose vicinity are also many other villages of the Lama people, all of which are described as situated on the Burhampooter. The village highest up this river is named Lisko, where the Burhampooter is said to be but a mountain rivulet, and on the west side of the same mountain from which this issues likewise proceeds the Dehong river.

*Dec. 12th.*—After quitting our halting place we proceeded up the bed of the Doo river, over large boulders of granite and serpentine, and where from the river passing between perpendicular scarps of rock we were unable to continue along the bed; it was found necessary to ascend the banks of the river, which, as they were very precipitous, was found to be difficult to be accomplished, and in many cases extremely dangerous to

pass. By 3 o'clock our party reached a flat piece of ground overlooking the river, where it was considered advisable to remain during the night.

The several clans in the neighbourhood of this stream consist of the Manneah, Tshee, Dhah, Tummaih, and Mlee, who altogether are a numerous people, but in appearance most indigent and ill provided both in food and clothing, and are as wild a set of unwashed savages as may perhaps be met with in any part of the world.

The water of the Doo is by no means good, having a disagreeable taste, and has the property of giving goitre to all those who drink it.

*Dec. 13th.*—On leaving the bed of this river, the ascent up the Dagoom range of mountains is very steep, and in many places where the rain had cut the side of the mountain into deep chasms, the path could only be passed by means of trees thrown from point to point, beneath which a perpendicular scarp of rock was all the resting place that would have been found had an unlucky step or a rotten bough caused any one to fall at any of these places.

On arriving at the village of Tuppang, I and my party put up at the house of the Gam, and as the Lama people were staying at a house not far distant, during the afternoon I had an interview with them. It appeared they had come across the snowy range for the sake of trading with the Mishmees for *teeta*;\* but from the snow having fallen unexpectedly, had not been able to return to their own country.

In appearance these people much resemble the Chinese, and are dressed in a loose robe that falls in folds around the waist, and are a fair and tall race of men; some wear the hair plaited in the Chinese manner down the back, while others have the head shaved; and from their description of themselves, it appears that those who trade with the Mishmees are likewise a hill tribe, and in their manner of life differ very little from the Mishmees themselves. I should however imagine, that the country they inhabit is not very rugged, as on all the cattle brought from thence I observed the marks of the plough distinctly visible on the neck†.

\* *Captis teeta*, Wall.

† This agrees with a report current in Upper Assam, that during an excessive inundation of the Burhampooter, a great number of ploughs and other agricultural implements were brought down by the floods.

The Assamese suppose the country they come from to be inhabited by Kotas; of which are the Assamese themselves, as the great body of the Assamese population.—F. J.

After conversing with them for some time, I found they were prohibited by their own Government from visiting the plains of Assam, and not having been to Lassa the capital, were unable to give me any precise information regarding the Tsampoo ; but said that, according to all they had heard, the river flowed into the valley of Assam after quitting the country to the north of the mountains, and is therefore in all probability identical with the Dehong.

The view from this village is very grand, as the distance from the snowy range, which was immediately opposite, was only two days' journey to the summit, and from this point (Tuppang,) I was told by the Mishmees that they were able to reach the village of Lamai in the Lama country in three days.

As no further population is to be met with on this side of the snowy mountains, I determined to retrace my steps from this point, as no advantage could, I conceive, take place by my proceeding any further in this direction ; I therefore on the following morning again left this village, and, varying my route so as to allow of my getting a sufficient set of sights to complete my survey, I arrived again at the Khamptee village on the 22nd of December.

From hence I set out to visit the celebrated Teeruth of the Hindoos, called the Brahma Kund, which I reached, and returned from, in two days. This place I found to be merely a bay or inlet of the Burhampooter, into which falls a small stream, that issues from the side of the hill immediately above it ; this is considered the holy water in which all the devotees who visit the place bathe themselves, and is reported to have the virtue of washing out all the sins that the person may have previously committed. During the time of the Ahoms, it was necessary for the king on his ascension to the throne to be washed in water brought from this place, and until this ceremony was completed he was not considered fit to take upon himself the reins of government : to insure the benefits of absolution, it is considered necessary, that the person should ever after forego the use of some kind of food ; but as this is left entirely to the person's own choice, such articles are commonly selected as are either not particularly liked by them, or such as are not often procurable. At the point where the water first shows itself, the large stone that covers the orifice as well as those on either side of the stream, were formerly gilt by a Khamptee Raja,

a portion of which gold is yet visible. The water of this streamlet is warmer than that of the Burhampooter, but is of a disagreeable taste. I was told by my guides, that the rains of 1843 considerably altered and damaged the place.

On my arrival at the Khamptee village I left by boat, and again reached the post of Laikwah, on the 30th December.

*Religion.*—The Mishmees seem to have but a very faint idea of any religion: they, however, worship a numerous set of Deos or gods, a great many of whom do not appear to have a name; the most to be feared amongst them, is the god of destruction, named Mujeedagrah, who in his attributes much resembles the Hindoo Sheo or Maha-déo. Sacrifices are also offered to Damipaon, who is the god of instruction and the chase; to Tibla, as the god of health and disease; and these two last named together with a god called Prepang, are supposed to wander about in company from place to place. When any disease appears in any of their houses, a priest of these people is sent for to drive away the evil spirit. This ceremony is performed in the following manner: The time fixed on for commencing is sunset, when the inmates of the house and the relatives of the person concerned are assembled within the house; and the priest having placed himself in the centre, he commences chaunting a dismal kind of dirge in a most monotonous strain. After this has continued some time, the priest rises with a fan in one hand, and a box containing pebbles in the other; with these he dances about on a mat, flourishing his fan and rattling his box; after this has lasted some time, he leaves his mat and begins moving up and down the house, continually singing the same tune; and arriving at the door, he pretends to drive the spirit out of the house: this is repeated several times, after which the intended sacrifice is led forth, and after much unnecessary cruelty, is killed by the priest and offered to the supposed spirit.

These people do not appear to have any very distinct conception of a future state, but suppose that all, whether good or bad, will go to the same place as their fathers and mothers have before them; and that, if the friends and relations of the deceased offer up sufficient sacrifices in their name, they will be permitted to return again to the earth, but failing in which, the spirit of the dead becomes an avenging demon, empowered to work all sorts of evil on the heads of the relatives who have omitted to perform the necessary rites.

*Burials.*—On the death of any person of consequence, the body is buried, and, according to the wealth of the family, a greater or less number of animals are slain, and the heads deposited around the grave on a frame-work of wood, in the centre of which a circular house is built over the grave itself, in which is placed flesh, both raw and cooked, together with grain, spirits, &c. and all the arms, clothes, and implements necessary for a person whilst living. Should the person be poor, the body is either burnt or thrown into a river if near at hand.

*Births.*—When the time of a woman's confinement is near at hand, a small shed is erected for her reception in the jungle near the house, in which she remains until the time of her purification is completed. If the child proves a male, this lasts for ten days; but if a female, for only eight from the day of its birth: during this time the mother is fed from the house, and none but her female relations are allowed to visit her.

*Marriages.*—Marriage amongst the Mishmees is perhaps the most singular custom that prevails regarding this ceremony. Alliances are usually contracted by the parents for their sons and daughters; and on the part of the man, presents to a large amount are required to be given to the father as the price demanded for his daughter, and which are usually proportioned to the rank and beauty of the woman: these presents consist of buffaloes, cows, gongs, salt, &c. &c. with a large quantity of dried field mice and fish. The wives allowed to one man are not limited to any number, but do not often exceed four or five. When a man dies or becomes old, it is the custom of these people for the wives to be distributed amongst his sons, who take them to wife; but the mother of any of the sons is always transferred to one of her husband's sons by another wife, so that a man is not actually obliged to marry his mother, but merely his father's wife.

*Dress and Arms.*—The dress worn by the Mishmees consists of a cloth bound round the loins, which passes between the legs, and is fastened in front, and a coat without sleeves that reaches from the neck down to the knees; two pouches made of fur are used, in which to carry their pipe, tobacco, flint, steel, &c., and on the back is carried a flat shaped basket, which is covered with the long fibres of the Sinwa tree, and ornamented with the tail of a Lama cow; below the knee is bound a quantity of finely split cane. The dress of the women is made of exactly the same material as that of the men, and consists of a bodice which barely



serves to cover the breasts, and a skirt that reaches from the waist as far as the knee; on the head is worn a tiara of silver, and a profusion of beads are suspended around the neck.

The principal weapons used are the spear, and a straight sword of Lama manufacture, to which is occasionally added a matchlock or crossbow, from which are projected poisoned arrows. When proceeding on any expedition of danger, a strong coat of sufficient thickness to ward off the force of an arrow is added to their costume, as well as a cap of fur, or split bamboo.

In person both male and female are disgustingly dirty, and, with the exception of a few of the chiefs, are seldom washed from one year's end to another.

*Manufactures.*—The clothes worn by these people are for the most part made by themselves, and consist of cotton which is cultivated by them for the purpose, and a few woollen articles made from the fleece of the Lama sheep, and in appearance seem to possess great durability both as to color and material. The hills, however, beyond the first range of mountains bordering Assam not being capable of producing cotton, the people beyond these limits are therefore entirely dependent for dress on the Mishmees bordering Assam, and the Lama people on the north side of the snowy range. In all other branches of manufacture, these people seem to be very deficient, and with the exception of spear heads and a few articles of this description, are capable of producing no kind of utensils that might prove of use to them in ordinary life.

*Trade.*—Trade is carried on by the Mishmees almost entirely by barter, and the tribes to the north of the Burhampooter may be divided into two classes, namely, those who trade with Assam and those who trade with the Lama people; the first usually bring down to Assam, swords, spears, gongs, copper vessels, with small quantities of Mishmee *teeta* and poison, which they exchange for cattle, salt, and various kinds of cloth, beads, &c.; but most of these articles not being produced by themselves, they are obliged to procure them from the Mishmees who trade with Lama, and for which they give cloths made by themselves, and those they take back from Assam. The second division having nothing to offer in barter but the Mishmee *teeta* and poison, which is only to be found on the mountains near the limit of perpetual snow; being in great request by the people of Tibet, they are enabled to exchange it for cattle, gongs,

swords, and copper vessels : they also barter a great deal among themselves, but the difficulty of passing through the country must always in a great degree tend to hinder the advancement of trade, as from the nature of the country it can scarcely be expected that any other mode of conveyance can be adopted, than that of carrying all goods in the baskets at present in use amongst them, which are placed on the back and supported by a band which passes round the head.

*Houses and mode of Living.*—The habitations of the Mishmees are generally, as much as possible, hid from the view by being placed in patches of jungle left for the purpose of concealment; they are usually built apart from each other, and unlike most other people, these Mishmees never congregate in villages. Their houses are all constructed with raised platforms, and vary from 12 to 15 feet in breadth, and 120 and 180 in length : a passage down one side communicates with the rooms, which are divided off into lengths of from ten to thirty feet long; down the whole length of this passage two bamboos are placed, on which are ranged the heads of all the animals that the owner of the house has killed during his lifetime, and which being constantly exposed to the smoke from the fires, and plastered with blood on the occasion of any animal being slain, turn to a perfectly black color with a fine polish. Above the fires, one or two of which are placed in every compartment, are hung crates of bamboo, which are used for drying and smoking whatever articles are required; and about these compartments blocks of wood are strewed, which serve the inmates for pillows. The under part of the house is appropriated to the pigs and fowls, in which they are confined by a paling of wood. The staple commodity of food cultivated by these Mishmees is a grain called babosa; it is used both for food, and to prepare an unfermented liquor, which is drunk in a hot state as soon as made. Rice is grown, but in small quantities, and merely by those tribes in the vicinity of Assam, and is not capable of being cultivated on the mountains in the interior: they however possess other kinds of grain, such as buck-wheat, Indian-corn, baitnah, &c.; but should all these fail them, they are capable of existing on the interior part of the Sinwah and Dhainkeeah trees, which afford sufficient nutriment to preserve them from starving, and affords excellent food for their pigs, on which they are commonly fed.

Flesh of all kinds is in great request, and all animals, from a mouse to an elephant, are eagerly devoured by these people, merely with the exception of crows, the black ape, and muster\* found in rivers : that of the women is much more limited, being confined to fish, wild birds, and field mice ; but, however fond they may be of animal food, they have not yet paid any attention to the breeding of cattle, but kill and eat whatever they may be able to purchase immediately on arrival at their villages.

*Customs, Manners, &c. &c.*—The domestic economy of the Mishmees does not appear to be burthened with many customs or observances such as are met with in civilized life ; but, nevertheless, some of their habits appear but little adapted to a savage state, amongst which I may mention the practice of not eating flesh, or any thing but plain boiled grain in the houses of their superior relations by marriage, but which does not apply if the case is reversed, as the superior relations are not prohibited from eating whatever may be offered to them in the houses of their inferior relations ; but as marriages and intermarriages are very common, it is but very seldom that a married man is capable of partaking of the rights of hospitality amongst his own or the neighbouring clans, although there may at the time be enough or even more than enough to satisfy all.

The whole of the tribes to the north of the Burhampooter as far west as the Degaroo and the source of the Tiding rivers, and to the east as far as the Doo river, may in a political sense be treated as one people, although the divisions amongst themselves into clans are numerous, among which the Taen and Maroo hold the two first places ; but, being so intimately connected with the other clans both by the ties of marriage and interest, cannot be regarded as a separate people or distinct from each other in any way except in name : every clan has, however, a nominal head ; but the power of their chiefs is extremely limited, and may be set at naught by any person who considers himself sufficiently powerful to assert his independence. Laws and punishments seem scarcely to exist, and with the exception of murder and abduction, no other crimes against each other appear of common occurrence ; this last is, however, a fruitful source of dissension and quarrel, and when any case of the kind takes place, the person from whom the woman has been taken, demands the amount he

\* Sic in MS.—Eds.

paid to her parents for her from the man who has taken her away, which if he gives, the affair is generally ended, as they never take back a woman who has misbehaved in this way ; but should the man refuse, or be unable to pay the demand, the man who has lost his wife, lies in wait to slay the seducer, and if successful, it then becomes the duty of his relatives to avenge his death.

Agriculture appears to be conducted in the most rude and simple manner, and the use of the plough is unknown. When the time of sowing approaches, the surface of the ground is merely scratched with a small kind of hoe, which penetrates but a few inches into the earth ; and domestic animals, with the exception of pigs and fowls, are not reared.

Slavery does not exist to any very great extent amongst them, and is chiefly confined to such individuals as they are enabled to purchase from other tribes, although some few instances of persons being sold of their own tribe amongst themselves are to be met with. It is, however, carried to a far greater extent by the people on the other side of the snowy range, and I am given to understand that whole villages of Assamese are in great numbers in the Lama country.

*Geography.*—The geographical features of this part of the Himalayah range, do not in any very essential particulars differ from those of other mountainous countries : in every direction it is intersected by small streams, which either fall into the Burhampooter or the larger tributaries to this river, the Tiding, Dillee or Doo. The height of the mountains is somewhat less than those more to the west, and with the exception of the snowy range itself, no mountains on the side of Assam are covered with perpetual snow, although during the winter months the peaks of all of them become more or less covered ; but even at these heights the fir, which is usually indigenous to mountain tracks, does not exist, being entirely confined to the Lama country, and the part of these hills marked in the map as the Myjoo country.

*Geology.*—As the formation of these mountains is entirely confined to primitive description of rocks, it does not perhaps afford so fruitful a field of investigation into the science as may be found in other parts of the world. It nevertheless must possess some interest to the geologist, as almost every variety of these rocks is to be met with in the greatest profusion ; a considerable part of the first range passed over by myself is composed of dolomite or gypsum, in which also is to be found a great

quantity of alabaster. On the left bank of the Tiding, primary limestone prevails; beyond which micaceous formations are numerous, which in the vicinity of the Toolooah river become mica slate. Serpentine abounds in the bed of the Burhampooter, and granite would appear to occupy the higher elevations of the mountains, as I did not perceive any in sitû, although boulders were plentiful in all the streams. I however beg to submit these observations with diffidence, and trust that the few specimens forwarded herewith may throw some light on this subject when submitted to more competent judges than myself.

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MY DEAR SIR,—I have the pleasure to forward two heads of the animal which, in some of your communications you informed me, were supposed to belong to an animal somewhat resembling the African Gnoo.\* It however appears, from the descriptions given of it by the Mishmees, to be of the deer [antelope] kind, and is called by them *Takang*, and by the Khamptees, *Khing*. In size the animal is but a little smaller than a buffalo, having an immense chest and shoulder, but small hind quarters; the fore-legs are large and powerful, but taper off below the knee; the under part of the neck is furnished with a dewlap that reaches nearly to the ground, and is covered with long hair; the skin is speckled, and on the top of the back and neck is almost black; the tail resembles that of the deer, being only two or three inches long, and is turned up when the animal is in action. It is only to be found near the snow, and is said to be very fierce and dangerous to approach.

The fur cap that accompanies the heads is made of this animal's skin: the larger head is of a male, and the smaller of a female; but the — † of both have been as much as possible cut away to enable the hunters to bring them in. I am happy to say, that I have been promised by the Rannah Gohain's son a complete set of all the bones, together with the skin of the beast, which I hope he may shortly succeed in procuring. The other head is that of a Lama cow.‡

\* This animal is supposed to be as yet undescribed. I will forward the specimens by the first opportunity.—F. J.

† Illegible in MS.—ED.

‡ Most of the specimens here mentioned have arrived at the Society's Museum, including a skin of the *Takang*, and a frontlet and horns; also the head of the "Lama cow," which would appear to be of the hybrid Yak race, termed *Yho* and *Yho-mo*, was according to the sex. The *Takang*, however, cannot well be described until its bones or at least the entire skull, with the skin of the face and the extremities, come to hand.—*Cur. As. Soc.*

Soon after my return from the Mishmee hills I again left Saikwah, and proceeded by elephant up the Koondil-panee, and after passing the mouth of the Depho-panee, followed up the course of that stream, until I arrived at the foot of the hills; and as the fort I was in search of was said by my Khamptee guide to be between the Depho and Jameesa, I took a direction through the jungle about east, and without much difficulty arrived at the fort five days after quitting Saikwah.

This fort\* is said to have been built by Raja Sisopal, and is situated on an elevated plain at the foot of the hills; the extent of it is considerable, as it took me about four hours to walk along one side of its faces: the defence is double, consisting of a rampart of stiff red clay, which, as the surrounding soil appears of a different nature, must have been brought from some distance. Below this rampart is a terrace of about 20 yards in breadth, beyond which the side of the hill is perpendicularly scarped, and varies from 10 to 30 feet high; the principal entrance, and the defences for some distance on either side, are built of brick, and on many spots in the interior I observed remains of the same materials, so that in all probability the houses occupied by the inhabitants must have been built of masonry. As I was unable from scarcity of provisions to remain more than one day at this place, I could not examine it so minutely as I could have wished. It seemed however to be composed of only three sides, the steepness of the hill at its north face precluding the necessity of any other works. At present the whole of the northern part of it is thickly covered with tea, which extends, according to the Khampteers who know the locality well, in a belt of more than a mile in depth all along the foot of the hill within the fort, and not as marked in my map, which was drawn before I visited the place. More to the west between the Dihing and Dehong is a much larger fort, and, as I believe, entirely composed of brick, as well as a tank of similar construction, surrounding which are numerous hill forts of small dimensions erected by a Raja named Bhishmuk, and the popular tradition amongst the people of this part of the country is, that on the destruction of the empire of these kings by the Hindoo god Krishno, the people who

\* Of these forts we had very imperfect information before, and I believe Lieutenant R. is the first officer who ever visited them. They refer to a time of which we have no history or even tradition, further than frequent traces of the dynasty of the Pals throughout Assam.—F. J.

were able to make their escape fled to the hills, and have in the course of time become converted into the present tribes of Abors\*. Near these forts a great number of wild Methuns† are to be met with, and the whole of the country, from the mouth of Koondil to the base of the hills, presents many indications of former cultivation. On this expedition I was absent nine days.

*Dibrooghur, 6th February, 1845.‡*

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*Note on a curious Sandstone formation at Sasseram, zillah Shahabad.*

*By Lieut. W. S. SHERWILL, 66th, B. N. I. With a Plate.*

At the foot of a hill at Sasseram, zillah Shahabad, which forms the termination of a spur thrown off from the Northern face of the lofty range of the Kymoor Sandstone Mountains, I observed a curious apparent horizontal columnar formation in the sandstone, as shown in Plate 1. The disposition of the sandstone at this spot has all the appearance of a quantity of horizontal columns, of several feet diameter each, and overlying each other to the height of twelve feet, the lower ones much flattened by pressure. At this spot also they have suddenly ceased, terminating in a steep bank, from which they protrude in great numbers, resembling a series of rudely-pointed horizontal obelisks, weather-stained to a very dark hue, with a strong cobalt tinge. Their exposed situation at this spot has tempted the Sasseram stone-cutters, who, with wedges, have cloven blocks from off these columns for building purposes; but by so doing, have made it evident that they are not solid columns, but a series of spheres; each sphere composed of a great variety of differently colored and exceedingly hard concentric strata of siliceous sandstones, concentric upon a nucleus, but the strata exceedingly difficult to exfoliate, the rock being purely siliceous, throwing back the hammer with great force. These spheres are packed closely together, and so inti-

\* If the Pals were Buddhists, this tradition may allude to their overthrow by the Rajas of the Brahminical faith; but all authentic records of those times appear to be lost, at least in this province.—F. J.

† *Bos. frontalis*, or an allied species.—*Cur. As. Soc.*

‡ I enclose a copy of this letter as a part of Lieut. Rowlatt's Journal.—F. J.

mately joined by some great pressure as to resemble columns; the pressure that has brought them into contact, whether from below, above, or laterally, has caused them to be much flattened on every side, so much so that they resemble square columns, varying from two to twenty feet in length; but on a closer inspection, the joint of each separate sphere may be traced on the side of the exposed column.

The bed, as far as exposed, Fig. No. 2, is about twelve feet in height, the top row of stones generally being nearly perfect circles, of about three feet diameter, the centre ones elliptical, and the lower part of the bed is composed of a series of layers of much flattened spheres, varying from ten to two inches in diameter; and although crushed into so small a space, each individual stratum, however fine or thread-like in its structure, is perfectly preserved and well exhibited.

In Fig. 3, where with the aid of steel wedges I managed to burst open a sphere, the fracture has taken place in the middle of a thin red gravel-like stratum of about one-eighth of an inch in thickness, and not through the whole strata or concentric coats, but leaving a corresponding hollow, from whence the globe containing the smaller strata and nucleus has started: upon chiselling away the outer surface of the protruding ball, another coloured stratum is discovered. In Fig. 4, a flattened globe presents its central group of strata projecting as a cylindroid; the fracture here, as is generally the case, has occurred at one of the gravel-red strata, of which nature are all the delicately pencilled concentric rings noticeable on the fractured surfaces of Nos. 1, 2, 3, 4 and 5 Figs. The intermediate strata are composed of fine white arenaceous particles, intermixed with red, black, and brown particles of the same nature. The red lines, which in some specimens are almost invisible from their extreme fineness, are evidently tinged with the oxide of iron, traces of which are also visible on the outer coating of the globes. Some of these globes, flattened out to an immense size, I have calculated must have been six feet in diameter when perfectly spherical, with many hundred concentric strata, though not all perfect, some running into and crossing each other in great confusion; but the generality of the well developed strata are perfect.

It is difficult to imagine how such a series of not only concentric lines, but concentric spheres, similar in arrangement to the coats of a bulbous root, could ever have been formed upon so grand a scale, for

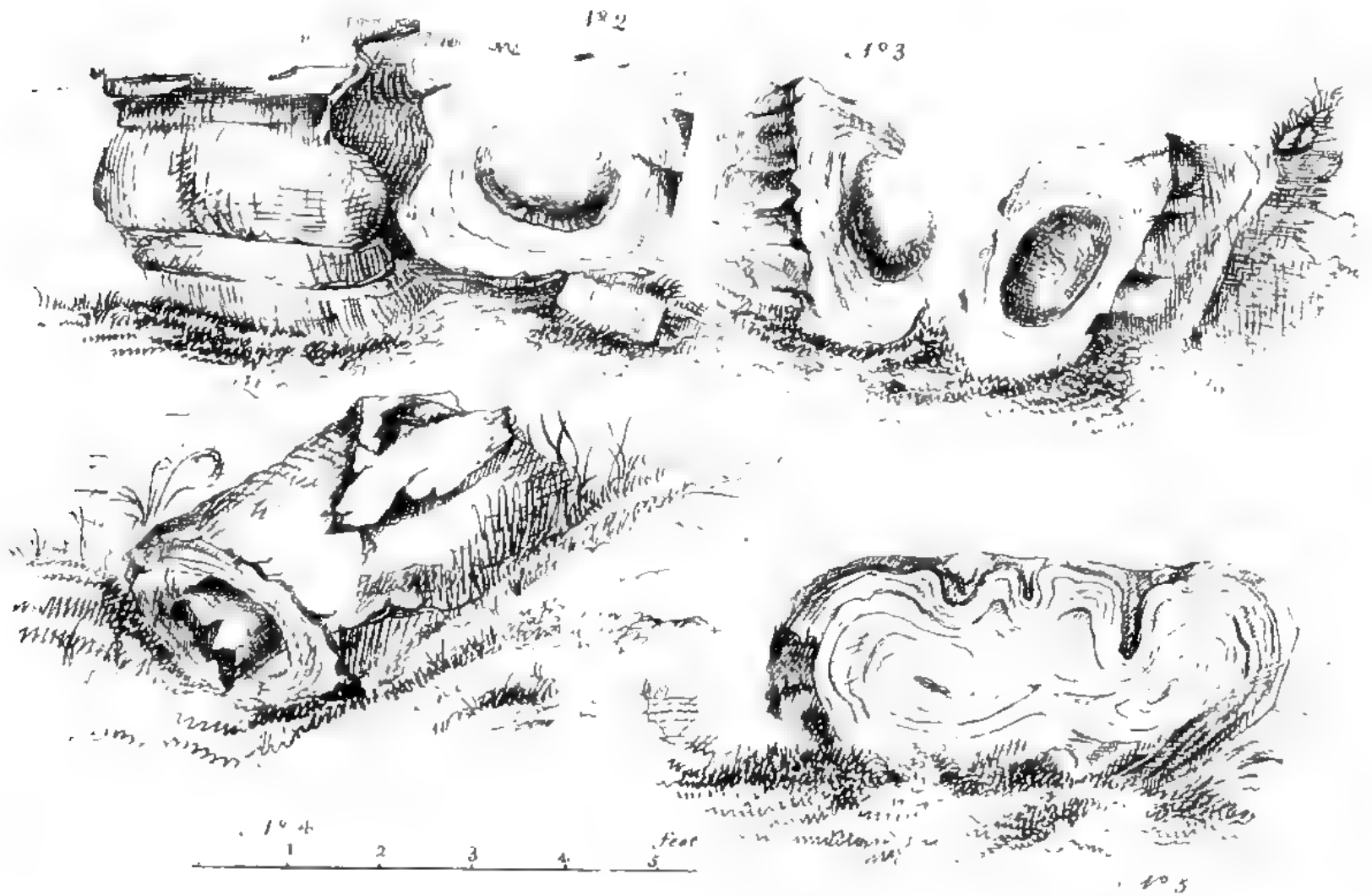


440 feet high -



191 Siliceous Sandstone at Sasseram. March 1845-

W. S. Sherwill 1845



Sandstone Formation at Sasseram 1845 March

W. S. Sherwill - 1845

( Siliceous )



in their formation no trace is left of the globes ever having, at any period, been at rest. Had they been so, the point d'appui, or that part pressing or resting on the ground, most certainly would *not* have had the concentric strata passed under it; that the strata *are* concentric to a common nucleus I have proved by bursting open many of the globes, the strata invariably exfoliating as in Nos. 3 and 4. The nucleus, whatever it may be, must be an exceedingly small and insignificant particle, as I have fractured through several globes to within a quarter of an inch of the innermost centre, and found nothing; the strata varying from the fineness of a hair to six inches in depth, and the spheres from six feet diameter to the size of a pea.

Having noticed a series of what I thought were the projecting edges of small shells running in a straight line nearly parallel to the major axis of one of the elliptical stones, and traversing all the strata, (vide No. 1, fig. *a*.) I had it broken open in that line; and in so doing, exposed to view a bed of about a foot in width, of very closely compressed blotches, of a delicately soft argillaceous substance, of a pale yellow color, impalpably fine when dissolved in water; no individual particle being visible under a powerful lens.

I traced this curious formation for about two hundred yards along the base of the hill where it suddenly ceases, the sandstone regaining its usual horizontality of stratification.

*Notes, chiefly Geological, across the Peninsula of the Southern India, from Madras, Lat. N. 13° 5' to Goa, Lat. N. 15° 30' by the Baulpilly Pass and Ruins of Bijanugger.* By CAPTAIN NEWBOLD, F.R.S., M. N. I., Assistant Commissioner Kurnool, Madras Territory.

*Physical aspect of the plain between Madras and the Naggery mountains.* The country lying between Madras, and the Eastern Ghaut line of the Naggery hills, is a maritime plain, about 34 miles broad, rising gently towards the base of the mountains. It is watered by the Coom stream, which finds its way to the sea at Madras, and by the Cortelair which, after receiving the Naggery river, communicates with the sea by the salt lagoon of Ennore, about ten miles North of Madras.

A few gentle undulations or swells running generally to the S.W. alone interrupt the flat monotony of this great plain, the surface of

which is studded with numerous trunks, and often verdant with rice and raggi cultivation.

Plantations of the betel-vine and patches of sugar-cane are scattered here and there, and tall groves of cocoa-nuts and palmyras tower over an underwood composed chiefly of the dwarf date, cactus, euphorbia, and mimosa. These form a low jungle covering the higher sterile, dry patches, which intervene between the lower cultivated portions.

*Soils.* The surface soil is usually sandy, and many extensive tracts are entirely covered with a fine sand resembling that of the sea, and lateritic debris. The sandy soil occasionally passes into a silt and fine red clay, largely used in pottery and brick-making.

The subsoils are in some situations beds of kunker of various thickness, of *mhurram*, or disintegrated rock, and granitic and hypogene rocks; thin beds of grey marl overlie, near the coast, beds of a black clay imbedding pelagic shells of recent species, laterite, and a loosely aggregated sandstone which passes into slate clays, both white and coloured, with oxide of iron of various shades.

Of the rocks above-mentioned granite, gneiss, and hornblende schists are found basing all the rest, occasionally rising above the surface, but in general thickly covered. The granite near the coast is usually of the variety termed pegmatite, being composed of quartz and felspar exclusively; above the surface it commonly appears in naked bosses, and detached concentrically-weathering blocks. On approaching the base of the mountains these blocks become more frequent, and are mingled with similar globular masses of basaltic greenstone, outgoings of the numerous dykes which prevail in the granite and hypogene rocks. Fragments of quartz rock, chert, jasper, and sandstone also occur, more or less rolled, derived doubtless from the Naggery beds. The gneiss usually contains hornblende.

Occasional beds of laterite occur. One I observed between Madras and Poonamallee, which passes into a loose sandstone and felspathic shale. Laterite has been employed in the construction of the fort at Poonamallee and in the revetment of the old fort of Tripassore.

*Eastern Ghauts.* The southerly line of Ghaut elevation appears to terminate on the N. bank of the Naggery river, south of Hodgson pettah, and farther west in the bluff peak of Naggery nose; but it, in reality, suffers a deflection westerly and southerly, forming a great mountainous

curve by Muddoordroog, Chellumpolliam, and Mymundeldroog to the great break of the Eastern Ghauts at Sautghur.

The low hills at the foot of the Naggery chain are of granite, gneiss, hornblende, schist, and basaltic greenstone. The height of the main chain itself near Cumbancumdroog, where it supports a small table-land, is stated at 2550 feet above the sea. The sandstone cliffs by which the chain is crested have a columnar aspect; but those forming the lower part of the ridge clearly proved this appearance to be deceptive, and that the rock rests in thick beds on the granite, having a dip towards the west. The columnar appearance is owing to the nearly vertical fissures which intersect the strata at right angles; and which, in the thicker beds, constitute their most marked feature. A highly illustrative instance of the jointed structure is seen in the mural sandstone cliffs cresting the sacred hill of Tripati. These cliffs usually support table-lands of greater or less extent. To the east of the chain, between it and the sea, runs a low flat-topped ridge, which for want of leisure I was unable to examine. The Naggery hills, as the traveller proceeds in a N.W. direction, lose their peculiar crested appearance, and acquire a smoother outline,—a feature possibly to be attributed to the almost total disappearance of the granite and greenstone on which they rest. The Tripati spur, however, which takes an abrupt turn to the east, resumes this appearance;\* but it again disappears in the hills of Curcumbaddy: the latter, as we ascend towards the table-land, diminish in height, and acquire rounder tops and gentler declivities, in general clothed with vegetation.

*Tripati.* The approach to Tripati from the south is extremely beautiful, lying over a large and cultivated plain cinctured by an amphitheatre of picturesque hills. The plain gradually slopes to the foot of the holy mountain, at the southern base of which the town of Tripati lies. The mountain itself, with its mural crest of reddish sandstone, the path for pilgrims to the celebrated shrine leading up its steep side, commanded by three antique pyramidal gateways, and the town at the

\* I have since heard from Capt. Bell, Engineers, that a porphyritic granite is seen at the western base of this sacred mountain. Greenish and dark coloured whetstones are often used by native barbers all over the country, which are quarried in the argillaceous beds near Tripati, but are not so much prized as the imported Turkey oil stones.

foot overlooked by lofty pagodas,—form an interesting study for the pencil. The surface of the plain is covered with a reddish sandy soil. The old boundary of the Tamul and Telinghi kingdoms, the Andra and Dravida-des, is in this vicinity.

*Curcumbaddy.* From Tripati to Curcumbaddy the road skirts the southern flank of the Tripati hills in an E.N.E. direction to Curcumbaddy. The rocks in the immediate vicinity of Curcumbaddy are of a crystalline sandstone passing into quartz rock of a white or slightly green hue, radiated with red bands.

*Baulpilly.* From Curcumbaddy the road at first lies over a short table-land, and then descends into the valley of Baulpilly, bounded to the E. and W. by two ranges of hills. The face of the country is covered with a thicket abounding with bamboos. The soil is red, but darker and softer, from the admixture of argillaceous and calcareous matter, than that hitherto seen : it contains vegetable matter mingled with the alluvium. Bajra, raggi, and culti are cultivated with success. The formation consists of sandstone less quartzose than that of Curcumbaddy, and of the argillaceous shales into which the Cuddapah limestone passes. The lines of cleavage in the latter are nearly vertical, and almost at right angles with those of stratification ; but I did not observe them passing into the structure of the sandstone. This may be seen near the rude barrier gate of the Baulpilly Pass. The softer shales are usually found in the lower parts of the valley, and the sandstone capping these summits of the hills. Dykes of basaltic greenstone occur traversing the shales and slates ; also veins of quartz. Fragments of flinty slate, chert, and jasper are frequent. The surrounding country is wild and romantic.

*Codoor.* The road passes partly through a bamboo jungle up the centre of the Baulpilly valley in a north-westerly direction to Codoor, a small village in the Cuddapah collectorate, 108 miles travelling distance N.W. from Madras. Here the hills on either side open out into a delightful plain watered by the Gungama, and smiling with cultivation, principally of bajra, raggi, culti, and indigo. The Pass of Baulpilly leads over a rocky belt that stretches across the valley, and forms an anticlinal line, from which the Gungama and a branch of the Calastray river flow in contrary directions ; the first towards the N.W. to the Pennaur, and the latter towards the S.E. by Calastray. The

formation is argillaceous limestone passing into argillaceous shales, capped occasionally by sandstone. Extensive deposits of kunker contribute much to the fertility of the soil.

*Nundaloor.* The route from Codoor to Nundaloor, a distance of thirty miles and upwards, lies up the valley of Baulpilly, which is obstructed in many parts by rock spurs from the flanking ranges. Approaching Nundaloor the hills become barer, more conical and mammiform. Nundaloor is a small town, about  $137\frac{1}{2}$  miles N.W. from Madras, and situated on the left bank of the Baugonuddi or Cheyair stream, which flows northerly to the Pennaur river, east of Sidhout; and is here three furlongs broad, with a bed of coarse sand. The surrounding formation is argillaceous and calcareous shales, schist, and sandstone: the soil is sandy; and produces, among other articles, indigo and a considerable quantity of rice. The rice lands are irrigated by a large tank, situated a little to the west of the village, which derives its supply principally from the rain water that rushes down during the monsoon from the tops and sides of the hills lying to the westward. Palmyras appear to thrive in low situations in the sandy soil. In some of the hills in this vicinity the lines of stratification can be distinctly traced, even at a considerable distance. The strata dip at an angle of  $12^{\circ}$  to the south of east; the strike of the beds N. by W. The cleavage lines of the shales and schists are much more vertical than the planes of stratification, forming with them an angle of about  $45^{\circ}$ , but dipping in the same direction. The latter are distinctly marked, even in hand specimens, by alternate parallel light and dark bands. The seams are often filled with friable calcareous incrustations. From a compact argillaceous slate of a light greyish green with fine chloritic laminæ, it passes into white and purple shales. Minute spangles of mica occur disseminated. The sandstone, as we recede from the granite, becomes less crystalline, and acquires argillaceous matter, though veins of white quartz are still seen traversing it. The light coloured argillaceous slate, held in the platinum forceps before the blowpipe, whitens and fuses into a whitish enamel; the purple shale after deepening in colour melts partially, and with difficulty, into a number of minute greyish globules. With borax it fuses into a light green glass, which becomes greyish on cooling; and, with carbonate of soda, with effervescence, into a glass of a darker green. The soil here is sandy and calcareous; debris of the sandstone, limestone, and clay

slate. From Nundaloor the range of hills flanking the western side of the valley is crossed by a defile to the plains of Cuddapah. The summits of many of these hills are capped with sandstone; while limestone and its associated shales are seen near their bases in the vallies, as at Wontimetta and near Bankrapet.

*Cuddapah.* Cuddapah is situated at the western entrance of the flat valley of the Pennaur, from which river it lies about six miles south. The height of the plain, in the midst of which Cuddapah is situated, is about 500 feet from the level of the sea. The Pennaur flows at the base of the northern range in an easterly direction towards Nellore, below which it disembogues into the Bay of Bengal. The stream, on the banks of which Cuddapah stands, takes its rise in the hills to the south of the place, and pursues a northerly course to the Pennaur. Other streams of minor note intersect the plain. The soil covering the surface is generally black, mixed with sand and calcareous matter: to the west of the cantonment, a thin stratum of sandy soil overlies a bed of kunker, from one to four or five feet thick; in some places compact like travertine, and in others having a pisiform, tuberoso, and tufaceous structure. Some specimens when broken exhibit a crystalline radiated structure; others a concentric form. Below this lies a bed of limestone, generally purple and of a shaly structure, mingled with argillaceous matter. The bed of kunker, however, does not always intervene: the latter rock, where it is tufaceous, has often a concentric appearance resembling stalactite; and sometimes appears in pisiform concretions both detached and adherent to the subjacent mass. It is still in process of formation from water slowly percolating from below; the stems of the grasses around which it has formed, are often found undecayed.

*Eastern Range. Ghauts, North of Cuddapah.* On ascending the range, north of Cuddapah, where it overlooks the diamond mines of Chinnoor and Ovalumpully, I found the base and sides to be covered with angular fragments of a very hard ferruginous sandstone. Advancing a little way up the ascent, a narrow bed of a greyish quartz, following the line of bearing, is crossed. Here and there slightly convex plateaus of compact crystalline sandstone, passing into quartz rock, of various shades of red, are observable amid the loose blocks and vegetation with which the surface is almost concealed. Large amorphous masses of the greyish quartz rock appear at irregular distances on the summit; some of them ten feet high.



Fragments of the same are strewed around, partly lying upon, and partly imbedded in, a fine reddish soil resulting from the weathering of the subjacent rock. Near the summit I picked up pieces of a vesicular ferruginous rock with tubular sinuosities, a species of laterite, and apparently of the same structure as that on the summit of the Ganjicotta hills. The tops of these, as well as of the other hills in the vicinity, present slightly convex plateaus forming table-lands of circumscribed extent. The relative altitude does not suffer any considerable variation, not exceeding, I believe, 1500 feet above the level of the plain. The sides are deeply indented by abutments jutting out at right angles to the line of bearing. In the ravines that separate them, fine echoes are produced. The sides and summits are thickly clothed with vegetation and low forest. The wells at the base of the range to the south of Cuddapah are cut<sup>d</sup> through strata, varying from eight to twenty feet in thickness, of compact and tufaceous kunker.

*Bankrapet Range, South of Cuddapah.* Passing the small tank of Ipa-Penta, the ground gradually ascends and becomes jungly. Several rivulets are crossed until a rather high ground is reached, where two defiles branch off; the one to the left or east, leads to the water-fall of the Pedda Garhi, and the other to the right to that of the Chinna Garhi. There I pitched my tent on the right bank of a stream, and proceeded on horseback over a stony jungly path winding through defiles, overlooked by jungly hills and mural precipices of sandstone. The Pedda Garhi is one of those singular fissures through the sandstone, like that of Ganjicotta, cleaving the rocks diagonally across the line of stratification from the summit to the base. The sides are precipitous rocky façades, narrowing rather abruptly, as the traveller advances southerly, into a fissure two or three yards wide, with salient and re-entering angles. At the base of the western cliffs are pools filled with the clear water, which drips in a perpetual rain from seams in the disrupted stratified rocks which have a dip of about  $8^{\circ}$  to the N.E. The precipice on the left, or on the north-east, distils no water. Here we see one of the very few illustrations observed in Southern India of the theory of springs. The water evidently percolates through the porous strata capping the higher adjacent summits to lower impervious beds, where collecting it follows the dip of the strata, and finds an exit in the fissure which has

broken off the continuation ; between the rocks on the right and those on the left, the latter are of course perfectly dry. The cleft in the rock proceeds, according to the natives, to a considerable distance, till at length, from the height and closeness of its high rocky walls, the rays of the sun are excluded. Natives from superstitious motives dread exploring its recesses, and tell many incredible tales of the vengeance with which the *Genius Loci* has visited intruders. The bottom of the fissure is completely covered with water to an uncertain depth. Hundreds of the finny tribe sport in the clear depths of the water, which I could not persuade the guides to attempt to catch, as they hold them sacred.

*Chinna Garhi.* I now proceeded to the smaller spring, or the Chinna Garhi. Here the water gushes in a small silvery cascade from a cliff about 200 feet high into a deepish pool among the rocks below, disappearing through a narrow cleft, probably a continuation of the principal fissure, to re-appear in the form of a spring below by some fault or dislocation in the strata. In the rains it cannot run off by this outlet as fast as it collects, and a large deep bason is formed, as evinced by the black ferruginous coating with which some of the rocks in the vicinity are covered. The temperature of this pool I found to be  $68.5^{\circ}$ , three feet below the surface; temperature of air in shade  $80^{\circ}$ ; in sun  $86^{\circ}$ . The dropping of the thermometer into the water disturbed hosts of the small fishes that rose to the surface, evading all my efforts to catch them. The water is remarkably transparent, sparkling, and agreeable to the taste, probably from containing a large proportion of fixed air.

The formation of the range in this neighbourhood is a reddish white, and greenish sandstone, interstratified with shales of various shades of purple and light green, and passing into quartz rock, or arenaceous schists. Large cavities occur filled with beautiful crystals of quartz, and a little hæmatitic nodular and stalactiform iron ore. I observed a furnace for the smelting of this at the foot of the range. The rocks are distinctly stratified, having a dip towards the North and East, varying from  $12^{\circ}$  to  $6^{\circ}$ . The joints dip about  $70^{\circ}$ , and are crossed by others at nearly right angles, separating the masses into cubes and rhombs. The ripple mark is seen very distinctly on the lamina of some of the arenaceous schists. The soil is a light red, and sandy: the vegetation

on the hill sides, luxuriant. Few of the trees or shrubs were seeding or flowering, but amid a multitude of others I observed the *Tectona grandis*, *Dalbergia latifolia*, *Pterocarpus Santalinus*, *Erythrina indica*, the *Mimosa Xylocarpa*, *Carissa spinarum*, and the *Ixora parviflora* used for torches. In the plain are seen the *Aloe perfoliata*, *Euphorbia*, *Cassia auriculata*, *Ficus indica*, *Elate sylvestris*, *Borassus flabelliformis*, *Melia azadirachta*, *Tamarindus indica*, and the *Asclepias gigantea*. The principal articles of cultivation are saffron, indigo, white juari, raggi, rice, castor oil plant. Among the wild animals frequenting the hills are the tiger, leopard, bear, porcupine, wild bear, several varieties of monkeys, and also the Indian land tortoise.

I returned to my tent about 4 P. M., after being nearly twelve hours on horseback, and twenty-four hours without refreshment.

Started at three o'clock this morning towards Cuddapah : after about eight miles ride arrived at the *Bhuga*. This is a sacred spring in a shady Tamarind tope. The Hindus have erected a small *Gopur* over it, and conducted the water from the mouth of a sculptured cow or bull, to be seen at the bottom of the clear pool in which the water collects. In the shade of the tope stands a temple to the tutelar god of the spring, *Bhugama Iswara* ; hard by are five or six other springs bubbling from the rock, and following into the river close by. The temperature of the two springs, which I tried at sunrise, I found to be the same, viz. 88° ; of the water in the river 72° , and of the atmosphere 65° . The springs are evidently thermal. The cause of their appearance is a fault in the subjacent sandstone strata. They lie about ten miles N. by E. from the Pedda Garhi. The water appears perfectly pure and well tasted.

*Chillumcoor*. This village and halting place is about twenty-six miles and a half to the westward of Cuddapah. It comprises about eighty houses, inhabited chiefly by *kunbis*, or cultivators. There are also a few Brahmans and Mussulmans. It seems to have once been a place of greater importance, and its pagodas have an air of considerable antiquity : they are dedicated to Iswara and Hanuman. Inscriptions on slabs of red sandstone now lying prostrate, do not afford the date of the building of these structures ; but inform us that the temple to Iswara was endowed by Harihara, king of Bijanugger, in 1305 of the Salivahana era, or

about A. D. 1383. The small *lath*, or pillar, in front of the temple to Hanuman, according to the inscription, was erected A. S. 1670 by Ram Reddy of Chintalconda, and Chunapa Reddi of Vellipaulum.

Cotton, indigo, raggi, juari, bajra, are the staple articles of cultivation. Soil, principally Regur with saline patches, taken advantage of by natives for the manufactory of salt. The adjacent country is a plain bounded to the north and south by low ridges of hills. Near the village the limestone alternates with thin beds of sandstone passing into a greenish arenaceous schist. A trap dyke has crossed both rocks; but, from the deep superstratum of soil the line of junction could not be seen. Fragments of rocks converted into jasper are seen marking the course of the dyke, which is attended by a profuse development of kunker. Incrustations of muriate of soda occur between the laminæ of the arenaceous schist, as may be seen in the well near the Traveller's bungalow. A little beyond this, a bed of a granular crystalline limestone is seen in contact with this schist, which, from the massive character of the detached blocks, and the structure and colour of the rock itself, has much the appearance of a grey felspathic granite or trachyte. To the N. E. it passes into a breccia with angular fragments of the arenaceous slate, siliceous limestone, chert and jasper imbedded. The presence of the two last minerals indicate the formation of this bed to have taken place subsequent to the intrusion of the trap dyke, which appears to have broken up the limestone and schist into the fragments now impacted in the crystalline breccia. The following is a section presented by a well in the neighbourhood of the village. (*See Plate.*)

The kunker is often dug out in rough square masses, and used in building walls. Blue limestone, with iron pyrites in nearly horizontal strata, is seen in the beds of all the rivulets in the neighbourhood, and also in the bed of the Pennaur, which flows about eight miles to the north of the village. The nearest hills are of sandstone.

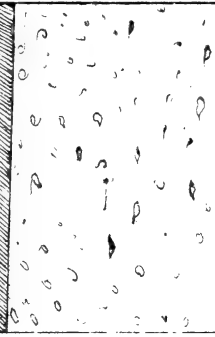
*Chittawarapilly.* The road passes for the most part between two ranges of sandstone passing into arenaceous slates of various degrees of fineness and compactness, which generally dip at an angle of  $6^{\circ}$  to the E. N. E. The higher hills are crowned with thick beds of sandstone supporting table-lands. Vertical joints and fissures often intersect these

2 feet



Regur with sand.

7 feet



Banker imbedding broken up  
portions of subjacent rock.

5 feet



Arenaceous schist in nearly  
horizontal strata.

Plate to Vol. I of Capt.

Newbold's Geological Notes



nearly tubular masses, which give an appearance of a wall of Cyclopean masonry, running in a line with the crest as far as the eye can reach. The lower beds will be generally found schistose, and of smoother outline.

*Range to the South of the Bungalow.* The eastern extremity of the range to the south of the road has a remarkably rugged appearance, and large masses of rock lie precipitated on its base and sides. On ascending to ascertain the cause of disturbance, I found the hill to have been penetrated by the ramification of a large basaltic dyke. The rock composing the dyke passes from a porphyritic to a compact structure. Pale green felspar crystals are imbedded in a crystalline paste of hornblende. Circular and oval cavities, filled with a faint reddish mineral resembling cornelian, and a white mineral resembling prehnite, are found in the greenstone. In the compact varieties augite replaces the hornblende. Near the summit of the hill the basalt appears in four and five sided prisms, about a foot in length, the lower part of the joints convex, fitting into the concave surface of the supporting prisms. A thin incrustation of carbonate of lime occurs between the prisms. The sandstone is highly quartzose, and ferruginous, and acquires a cellular slaggy structure resembling some varieties of laterite.

In wandering among the chain of hills to the S. of the Bungalow, I picked up some slabs of laminar sandstone, from the surface of which project oval and circular concentric concretions, from the size of a shilling to that of a half-crown in circumference. The outer circle is nearly white, the second darker, enclosing a hard solid nucleus. These concretions are harder than the imbedding sandstone, from which they are with difficulty separated, and by weathering less rapidly, project in relief on the surfaces of air-exposed slabs: they penetrated from half an inch to an inch into the substance of the rock. When broken, they do not differ in appearance from the sandstone, except in being a little whiter, and of a finer sand. Some of the more finely laminated slates present on their planes vivid dendroidal delineations.

*Range to the North of the Bungalow.* The sandstone hills to the North of the Bungalow support the table-land of Ganjicotta. Ramifications of a greenstone dyke are seen to run along their base, attended by a profusion of kunker deposit.

*Tallapodatoor.* This village stands in a plain on the right, or South bank of the Pennaur, about twelve miles W. N. W. from Chittawaripilly. The Gundicotta hills flank its North bank, from which they are about three miles direct distance. At their base I found a siliceous greenish slate which, higher up the ascent, is capped by tubular masses of sandstone dipping conformably at a slight angle of about  $4^{\circ}$  to N. E. The general direction of the strata, and of the chain itself, is nearly S. E. The laminae of the slates also run S. E., and are intersected by nearly vertical joints at short distances running E. S. E. These fissures pass into the superjacent sandstone. Cavities, which have apparently once been filled with a ferruginous earth or clay, are here frequent in the faces of the sandstone cliffs.

*Concretions in the Sandy banks of the Pennaur.* The steep bank of the Pennaur near Tallapodatoor is composed of a thick accumulation of sand, silt, quartz, and jasper pebbles, and kunker. The latter is seen often in stalactiform concretions in the substance of the sand and silt, which have been formed by the infiltration of water charged with lime. In many instances these concretions have formed round the stems and roots of grasses, some of which are still vegetating within their stony case; but by far the greater portion have withered, passed into dust, and fallen out leaving cavities or casts.

Small dunes of sand are seen in this vicinity on the South bank of the Pennaur drifted by the N. W. winds.

*Tarputri.* At Tarputri, the next march, are two handsome pagodas, dedicated to Chintal Raya and Ram Iswara, elaborately decorated with sculptured bas-reliefs representing the exploits of Rama, and the adventures of the Indian Apollo, Krishna, and other mythological events. Among them is a figure holding a bow, made like the Grecian bow, a form rarely met with in Hindu sculpture. The unfinished gateway of dark basaltic greenstone presents a mass of graceful sculpture scarcely excelled, in my opinion, by any thing in the ruins of Bijanugger, or Mahavelipur, though on a much minor scale.

The three Sassanams or inscriptions on stone in these temples, which I had copied, were in the Telugu character and language, may bear date severally 1429, 1431, and 1435 of the Salivahana era, and the name of the then reigning sovereign at Bijanugger, Narsengha Rayel.



Tarputri is still a considerable place : it is the capital of a taluk, with a population of about 4256 Hindus, (chiefly kunbis) and 2155 Mussulmans. The language is Telugu.

*From Tullapodatoor to Tarputri, (about ten miles).* The road lies over an extensive plain watered on the north by the Pennaur, covered with regur and a soil of a dark coffee red, except where limestone prevails, when it assumes a cineritious colour. The substratum is generally a bed of kunker. Trap dykes are frequently crossed. Tarputri is situated on the right bank of the Pennaur. The only hill in the vicinity is of greenstone, associated with a greenstone slate curiously mottled by dark oval spots. On the summit of this hill, I found kunker imbedding angular bits of the rock. Beyond Tarputri, near Vaimpully, close to a dyke of basaltic greenstone, masses of calcareous spar with quartz are seen jutting from the surface, many of them incrustated with drusy crystals of quartz. The spar, in some instances, has been penetrated by the basalt, and coloured of a dull green. Fragments of jasper, flint, chert, brown, green and white, are strewn on the surface. Mounds of kunker are also frequent. Trap dykes continue from Vaimpully to Ryelcherroo.

*Ryelcherroo.* Near this place limestone, sandstone, and sandstone conglomerate prevail, associated with jasper and chert. Tippoo, it is said, dug a considerable quantity of the latter for musket flints. The hill in which the excavations lie, is about  $1\frac{1}{2}$  mile S. W. from the small fort. Its base consists of a greyish laminar limestone, with a rugged external appearance, and veined with calcareous spar and quartz. Ascending the hill, the limestone becomes less crystalline, and changes its colour to shades of a greenish blue and pale flesh colour, until the sandstone conglomerate, by which the hill is capped, is reached. A little below the summit amid the blocks of pudding stone and sandstone, lie Tippoo's excavations for flints ; they are dug out in externally ochreous and rusty coloured, irregularly shaped, blackish, grey and white masses. They are a variety of chert far less tough than the English flint of the chalk formation, splitting easily on a smart blow. The summit of the hill is strewn with pieces of red jasper, and pebbles of a flinty quartz and calcareous spar.

A native of the village turns neat cups and vases from a pale yellowish and white magnesian limestone, which is procured at a hill in

the Pupál jungle near Yengunapilly, about eight or nine miles in a southerly direction from the Bungalow.\* It is a low hill, rising abruptly from the Regur or cotton ground at its base, with a gentle slope from the east into low cliffs of limestone which front the west, towards which quarter the hill falls with an abrupt and steep declivity. The surrounding hills are mostly of sandstone. The base is composed of a crystalline bluish grey limestone passing, as the cliff ascends, into a number of beautiful shades of red, yellow, green, and white. Some dark green varieties resemble precious serpentine; others imbed silvery white, and yellow pyrites. Calc spar, white, fibrous, and pale yellowish brown, occurs in veins, and coating fragments of rock. On the eastern slope of the hill is an excavation, whence the Brahmins dig a chalk, which is used for marks of caste, and for white-washing houses. At Putsa Marculpilly a massive asbestos, associated with a white magnesian and calcareous earth, occurs in a bed in the limestone. The former is of a dull greenish grey colour, passing into a mottled yellowish white. It is tough under the hammer, and breaks into fibrous flexible fragments.

*Junction line of granite with the Limestone and Sandstone formation near Yairypully.* A mile or two west from Ryelcherroo, between the granite range north of Gooty on the west, and the limestone and sandstone hills of Ryelcherroo on the east, extends a plain about a mile broad intersected by a nullah, which I examined in vain for a section showing the junction of the limestone with the granite. The surface of the plain is covered with angular pebbles of quartz, chert, jasper, and of a breccia composed of angular bits of quartz, derived probably from the granite, imbedded in a jaspery paste, and of a sandstone grit imbedding reddish jasper and chert, which is seen in veins in the limestone. The limestone composing the hills on the eastern boundary of this plain is siliceous; so much so, as to afford sparks with steel. It alternates in the same hill with a purple and yellowish shale, and a crystalline sandstone, which is generally found capping the summits. There are a few exceptions, however, where the limestone continues to the summit, the sandstone having been stripped off by denudation.

\* The Mussulmans, from the supposed qualities of the stone in discovering poison, call it "*Pad-zahr*," or Bezoar stone. By the Hindus on the spot, it is called "*Gurha Putsa Rai*."

Veins of calcareous spar and quartz intersect both rocks; the former also occurs in filbert-sized nodules in the looser varieties of the sandstone. The strata dip at an angle of  $10^{\circ}$  from the granite towards the E. The direction of the sandstone ranges is S.  $45^{\circ}$  E. The surface of the limestone is grooved with furrows, which have a generally south-westerly direction. This surface is uneven, unlike the regular polished surfaces formed by glaciers.

Crossing the plain towards the granite, the fragments become more quartzzy, and at the base of the nearest granite hill runs a belt of a pale reddish jaspideous rock in an E.  $10^{\circ}$  S. direction, penetrated by numerous quartz veins. Large beds of quartz occur also in the granite, and are often seen between this and Gooty to form entire hills. The limestone and sandstone terminate in a small hill on the left of the road, a little to the east of Yairypully, about nine miles E. from Gooty. The pebbles of the conglomerate have not been transported from any great distance; the angular ones appear to have once formed part of the jaspery and chert veins, which traverse the limestone; and the rounded pebbles have probably been carried by the stream from the adjacent hills. Their course may also account for the furrows just alluded to, on the surface of the limestone, on the summits of those hills which have not been capped by the conglomerate.

*Gooty.* The limestone and sandstone formation is now taken leave of. From the village of Yairypully, about nine miles east from Gooty, nothing but granitic trap and quartz rocks, associated with gneiss and hornblende schist, present themselves; the latter form several picturesque peaks to the left of the road. The rock of Gooty is a vast precipitous mass of a sienitic granite, composed principally of reddish felspar quartz, a little mica, hornblende, and actynolite. The actynolite occurs with felspar in thin veins of a lively green, or in drusy surface crystals. At its base, gneiss occurs with beds of a brilliant hornblende schist, dipping at an angle of  $62^{\circ}$  from the hill, *i. e.* to the west. This schistous bed forms the rising ground on which the Idgah stands: it is penetrated by quartz and granitic veins, which I was unable to trace to the main rock. It imbeds nests and drusy crystals of actynolite. Dykes of basaltic greenstone are numerous.

*Height of Gooty plain and rock.* The approximative height above the sea by the boiling point of water of the plain at the base of the Gooty

rock is 1200 feet ; and that of the summit of the latter above the plain, about 900 feet. From the old flagstaff at the top is a fine view extending over a sea of hills to the East and Northward ; and over the great *regur* plains of the Ceded Districts to the West. To the South the Gooty range is prolonged to the Cuddapah and Mysore frontiers.

A dark narrow cavern infested by bats is shown in the granite near the top of the rock, at the bottom of which is a well which the natives affirm, with little probability, communicates with the Paumri stream in the plain below. Gooty is said to have derived its origin from the Rishi Gotama's residence on the rock. The fort is naturally of great strength, and the favourite abode of the Mahratta chief, Morari Row.

*Goontacul.* Between this place and Gooty, from which it is about twenty miles West, granite, hypogene rocks and basaltic greenstone prevail ; the latter is seen often in long low black ridges of blocks piled one upon the other like a huge wall of masonry, and penetrating the associated rocks. The blocks and masses seen in the plain North of the village of Guntacul are principally of the usual granite of India, composed of felspar, quartz, mica, and hornblende, and schorl but rarely : the crystals of felspar are large and well defined. This large grained granite is penetrated by veins of a smaller grained granite with reddish felspar, and a few plates only of mica ; veins of compact opaque quartz coloured by actynolite, are often numerous. Schorl occurs in the blocks of granite seen scattered near the great tank of Rayelcherroo.

We now cross into the ancient Hindu kingdom of the Karnátak from that of Andhra. Both Telinghi and Canarese are spoken here and at Gooty ; but a little farther Westward, Canarese prevails.

*Guddacul.* Overlooking the bungalow on a craggy hill, stands a small conspicuous pagoda to Chouri Amma. It is the easternmost of a broken range from the W. N. W. At its Northern base is a thick bedded gneiss, with dark coloured mica in scales. The upper part of the hill is occupied by masses of red sienitic granite with thin veins of quartz and felspar coloured by actynolite. The crystals of hornblende disintegrate into a rusty coloured powder, which leaves cavities on the surface of the rock in falling out.

The rock on which the small fort stands is also of sienitic granite, penetrated by a greenstone dyke. At its base is an excavation, about eight feet deep, into a greenstone bed or dyke.

It is in various stages of disintegration, which has been hastened and modified apparently by the infiltration of water containing carbonate of lime and muriate of soda. The dark hornblende crystals have been converted into the green hue of diallage, which passes into a greenish yellow and *feuille morte*, and other deeper shades of brown. It is reticulated with seams, filled and lined with kunker. I have seen this singular effect produced on the colour of hornblende under similar conditions, in various parts of Southern India. It is probable, that the green, or greenish yellow-coloured rock, if analysed by the chemist, would afford different results to those yielded by the hornblende rock prior to disintegration. Thus rocks and minerals often decay only to appear in other and often more beautiful combinations.

The sienitic granite here exhibits great variety in structure and colour, from close-grained to porphyritic: flesh-coloured felspar and light green actynolite occur in veins.

*Bellary.* The clusters of rocks on which the fort of Bellary stands, those overlooking the Ball-practice ground, and the Peacock hills in the vicinity are all composed of a crystalline granite containing hornblende in addition to the usual components. The greater proportion of the felspar in this granite is flesh coloured, and imparts a prevailing tinge to the rock. The granite occurs in all its varieties in one mountain mass, compact and porphyritic, red and grey, micaceous and hornblendic.

The Peacock hills, and the broad-backed rock on which the fort stands, are nearly covered with loose cubiform blocks and rounded masses of granite, which appear as if shot out suddenly on the ground from some enormous cart. Many rise suddenly from the flat plain, like inverted tea cups on the surface of a table. Such is the aspect of most granite masses of S. India.

Tors and logging stones abound in the Peacock hills and on the cluster near the Ball-practice ground, where occurs that singular pile figured in the XIIIth No. of the Journal Royal As. Soc. in the article on the quarrying granites of Egypt and India. Here also is seen, one of those curious piles of calcareous scorïæ, attributed by the Hindus to the Racshasas of old.\*

\* Vide No. XIII, Journal Royal As. Soc., p. 129, &c.

Garnetic gneiss and leptinitic gneiss occur around the bases of these granite rocks in contorted strata; and further to the S. and W., rise the hornblende and chlorite schists into the ranges of Boodihal and the Copper mountain.

*Copper Mountain.* This dome-shaped mountain is the highest point of a ridge which runs by Jondoor N. Westerly to the Tumbuddra near Hospett, and about five miles Westerly from Bellary. It is said to be 1500 feet above the plain at its base, which at Bellary is about 1600 feet above the sea according to General Cullen's measurements. The great plain at its Eastern base extends Easterly as far as Gooty, Northerly to the North bank of the Kistnah, and Southerly to the Mysore frontier: it is for the most part covered with a rich sheet of *regur*, resting either on kunker or the debris of the subjacent granitic and hypogene rocks; and in addition to the bajra, and other dry grains of red soils, smiles with extensive crops of cotton, wheat, and the white juari.

The inferior ridges at the base of the range are chiefly of gneiss, and a reddish and faint greenish quartz rock. The great mass of the ridge is composed of hornblende schist passing into chlorite and earthy ferruginous schists, capped by a wall-like naked ridge of a dark brown rock composed generally of a greyish chert, and brown iron ore, or jaspideous red and brown clay, in alternate layers, and resting apparently on their edges; in fact, a ribbon jasper on a large scale. The laminæ are often highly contorted and waving. The crest is often broken up by transverse fissures or joints; and, at more than one part of its crest-like course, has suffered manifest disturbance. Its general direction is S. Easterly.

A columnar mass, about 50 feet high, crowns the ridge, not far from the copper excavations, and serves as a guide-post to their site, which is nearly obliterated by earth and fragments of excavated rock, and can be hardly found without the aid of a *Tulari*, or of a person who has previously visited them. A crater-like cavity, on the top of a small mound a few yards in diameter and of little depth, was pointed out as one of the excavations for copper made by order of Hyder. I examined the sides and bottom of this cavity, but did not discover any vein of the ore in the rocks composing them, though traces of the green carbonate in their seams and incrustations are seen on the refuse thrown out. On the right

of the ridge a little farther to the N. W., is another excavation at the base of the rocky crest of the range.

The ore appears to have existed only in these thin incrustations and seams, (for I could not find the slightest trace of any continuous lode or vein,) and the project was shortly given up by Hyder. The imbedding rock is a ferruginous slate clay, and the ferruginous quartz rock of the crest.

From the vicinity of these excavations rises the dome-shaped summit before mentioned, as the loftiest peak of the ridge. Its summit is flat-convex, and capped with laterite containing much iron. This tubular mass is precipitous on its S. W. side, and contains two apparently natural caves situate at the bottom of the precipices, of small dimensions.

In one of these stood the shrine of the tutelary deity of the mountain; and recent offerings of flowers, oil, and cocoa had been made in this rude rock temple. On the roofs and sides of these caverns are partial incrustations of common salt and alum, which appear to have been deposited by water percolated through the porous mass above, and which contains sulphuret of iron, by the decomposition of which the sulphuric acid has been set free.

This peak formed one of the stations of the Trigonometrical survey: a pile of stones on its surface marks the stand probably of the flag. The thermometer in the shade during the hottest part of the day stood at 72° Farenheit only, (July.)

Descending the ridge N. of this peak, a large dyke of trap is seen crossing the mountain in a westerly direction. White potter's-earth, kunker, and smoky quartz occur in the vicinity. At the base, a small seam of whitish saccharine limestone (marble) is seen in the hornblende rock.

The singular ranges and valley of Sondur to the Westward of the Copper mountain, have been described already, (*Madras Journal* for Sept. 1838, p. 128).

*Ringing stones of Courtney.* A little to the S. E. of the village of Courtney, about ten miles W. N. W. from Bellary, to the left of the road is a low, long, black ridge composed of blocks of basaltic green-stone piled one upon another,—the outgoings, in fact, of a dyke which penetrates and projects from the surrounding granitoidal gneiss rocks.

Their piled and separated appearance is entirely owing to that natural process of spontaneous splitting, and concentric exfoliation when exposed to the atmosphere, which I have attempted to describe elsewhere.

These blocks, like phonolite and other rocks of basaltic origin, give out a metallic sound when struck by a stone or hammer: and here, from the peculiar and often delicately poised position of the blocks, the effect is greatly enhanced. A few years ago an ingenious person in London made a sort of harmonicon from slabs of basalt and other rocks. The course of this dyke is South-westerly.

*Daroji.* From Bellary to the great tank of Daroji, about fifteen miles, the plain is flanked to the westward by the Copper mountain range, which is gradually neared. Granite and gneiss are seen in low hills and masses along its western base. A spur of this range ends at the S. E. angle of the Daroji tank, throwing out a few outliers in the direction of its line, viz. N. W. by N. This natural barrier line of elevation prolonged by an artificial embankment, or "*bund*," of stone and earth, nearly three miles long, dams up the water flowing down the sides of the ranges to the West, North-west, and South. It continues to the village of Daroji, beyond which is another outlier of the Copper mountain range.

One of the rocks in the line of the tank bund presents a vertical section of the strata, which do not materially differ from those forming the crest of the Copper mountain already described, and have a similar vertical arrangement of laminae. Traces of the green carbonate of copper also occur in it, and similar incrustations of the sulphate of alumina of an earthy texture, are found at the bottom of a quarry in a small hill crowned by a Hindu temple on the bund of the tank. Small seams in the rock are filled with this mineral. Laterite, associated with a blistery, and mammillary iron ore, occurs in a few small overlying patches.

A little to the North of this, beyond the village, lies a small hill of chloritic schist; and on its flanks, a lofty and extensive outburst of granite forming a chain of naked rugged peaks separated by deep transverse gaps or valleys, stretching towards the South. It flanks the plain West of the tank, and diverging towards the W., is lost in the still loftier elevations of Sondur.



At its contact with the chloritic schist the granite loses its mica, becomes a pegmatite, and is seamed with vertical lines of cleavage. The felspar of the granite becomes more compact, and is of a pale pink colour. Its quartz often acquires a greenish blue tinge, probably from the contiguity of the chlorite, and its structure becomes prismatic. Dark dendritic markings occur on the superficies of the prism.

A few feet from the line of contact the mica reappears in the granite. Thin flakes of chlorite, however, are visible in its structure, which impart to it a somewhat laminar character. Actynolite also occurs in the veins of eurite, quartz, and felspar, with which these mountain masses of granite are intersected.

The chloritic schist has been hardened and often converted into jaspideous rock at the contact. The smooth surfaces and the prismatic fragments into which it splits, on being struck by the hammer, exhibit dark arborescent delineations on a pale greenish yellow ground curiously contrasted with the dull, greenish blue colour of the schist. Short veins from the granite are seen penetrating the chlorite schist; and it is evident that, at this point at least, as at the celebrated locality of Glen Tilt, the granite must have penetrated this hypogene rock in a liquid or semi-liquid state. Some of the seams in both rocks are lined or filled with calcareous incrustations.

*Bijanugger.* From Daroji to the celebrated ruins of Bijanugger (about fifteen miles) the route lies through low clusters of hills principally of granite and gneiss. The felspar of the granite is usually reddish, and it is often coloured by actynolite of lively shades of green.

From the low grounds between these hills, hornblende and chloritic schists are frequently seen out-cropping, and are the outgoing of numerous basaltic dykes, the general direction of which is Westerly and North-westerly.

Angular and slightly worn fragments of a coarse variegated jasper, a ferruginous quartz and indurated clay, occur scattered on the surface of the valley along which the road lies, mingled with fragments of the other rocks in *situ*. It is probable these fragments of jasper have been derived from the Sondur ranges on the left or W. The range on the right, as Bijanugger is neared, assumes the more rugged and indented aspect peculiar to granite.

The whole of the extensive site occupied by the ruins of Bijanugger on the South bank of the Tumbuddra, and of its suburb Annagundi on the Northern bank, is occupied by great bare piles and bosses of granite and granitoidal gneiss separated by rocky defiles and narrow rugged vallies encumbered by precipitated masses of rock. Some of the larger flat bottomed vallies are irrigated by aqueducts from the river, and appear like so many verdant Oases in this Arabia Petræa of Southern India. Indeed some parts of the wilderness of Sinai reminded me, but on a far grander scale, of this huddled assemblage of bare granite rocks on the banks of the Tumbuddra. The formation is the same, the scantiness of vegetation, the arid aspect of the bare rocks, and the green spots marking the presence of springs, few and far between in the depths of the vallies, are features common to both localities.

The peaks, tors, and logging stones of Bijanugger and Annagundi indent the horizon in picturesque confusion, and are scarcely to be distinguished from the more artificial ruins of the ancient Hindu metropolis of the Deccan, which are usually constructed with blocks quarried from their sides, and vie in grotesqueness of outline and massiveness of character with the alternate airiness and solidity exhibited by nature in the nicely poised logging stones and columnar piles, and in the walls of prodigious cuboidal blocks of granite which often crest and top her massive domes and ridges in natural Cyclopean masonry.

The granite clusters of Bijanugger are continued on the opposite or Northern bank of the river to Annagundi and Gungawutti in the Nizam's territories. On the East they are bounded by the great *regur* plains of the Ceded Districts, and on the West by those of the S. Mahratta country. The country to the S. has already been described.

At first sight these elevations appear to have sprung up confusedly without order or arrangement; but I found, after ascending the loftiest summits, and after a careful examination of the direction of the laminae in the gneiss, interstratified beds, veins, and fissures, on both sides of the river, that the great general line of dislocation nearly follows that hitherto observed, viz. N. N. W. and S. S. E. and that the rock opening through which the Tumbuddra flows is a cross valley.

A few caves, both natural and artificial, occur in the granite. The natural caverns are usually fissures roofed by precipitated blocks, or the

spaces left between great superimposed masses of rock, and not, as in limestone, laterite, &c., galleries, or caverns in the substance of the rock itself.

The rock temple to Rungasami is in a low, dark cavern, formed partly by a fissure, and partly by artificial means.

The marks of the chisel in the granite quarries whence was excavated the material for constructing the great monolith statues, the temples, palaces, walls and aqueducts of this once magnificent city, are as fresh as if only of yesterday. Those in the blocks quarried from Syene in upper Egypt are almost equally as recent looking ; a phenomenon attributable in part, to the great dryness of the atmosphere.

About a mile easterly from Nimbapur, a small hamlet in the suburb of Bijanugger, lies an oval-shaped heap of calcareous scoria, about forty-five yards long by about eighteen broad, and from ten to fourteen feet high, partially covered by grass and other vegetation. It is evidently artificial, and of considerable antiquity. The Brahmins aver it to be the ashes of the bones of the Giant Walli, or Bali, an impious tyrant slain here by Rama on his expedition to Lanka (Ceylon\*.)

After passing a week in these interesting ruins, engaged in having the inscriptions on stone copied, rambling among its deserted temples and collecting the marvellous legends of the few priests that now linger on the principal sacred spots, I proceeded along the western flank of the Sondur hills, on the right bank of the Tumbuddra, towards the ferry into the S. Mahratta country at Humpsagur. With regard to the inscriptions it may be remarked, *en passant*, that the greater part are in the old Canarese character, (but the language is often Sanscrit,) and chiefly dated in the 14th and 15th centuries. One of them is curious, as showing that the bridge over the Tumbuddra was constructed by the Hindu prince Ramnatha, prior to the Bayel Dynasty of Bijanugger ; this is in Nagri character, on a stone at the foot of the mountain on which Hanuman is said to have been born, date A. S. 1211.

*Hospett.* Hospett lies about five miles W.S.W. from Bijanugger, near the point where the two ranges enclosing the valley of Sondur end, and

\* For an account of these heaps of ashes, vide Journal Royal As. Soc. No. XIII. p. 129, &c.

nearly meet, being connected by a high and massive embankment of stone and mud. These ridges have already been described, (*Mudras Journal of Literature and Science.*)

A dyke of basaltic greenstone crosses the plain between Bijanugger and Hospett in a westerly direction. It forms an eminence, on which is situated an ancient Mahomedan burial ground, a little to the W.N.W. of Camlapoor.

Granite blocks, with much red crystalline felspar, are seen in the ditch of the fort of Hospett.

Proceeding towards Humpsagur, the road lies along the stone embankment just mentioned. Gneiss is seen immediately at the eastern base of the hills, but their bulk is composed of a dull green hornblende schist, with much silex and argillaceous matter, crested by a jaspideous rock similar to that cresting the Copper mountain. This rock contains nests, and layers of iron ore and loadstone, or iron ore with polarity. This I first discovered in setting down my pocket compass on one of the ferruginous-looking masses which project from the surface of the mammiform hill overlooking Hospett, when I was surprised to see the north pole of the magnet whirl suddenly round to the south,—a hint to be careful in selecting spots for taking magnetic bearings, choosing a site for an observatory, or in selecting stones for the fixed stands of magnetic instruments, &c.

Quartz, both white and ferruginous, is abundant; and a white striated mineral resembling tremolite externally.

*Wallavapur.* This place is about thirty miles from Hospett. Below the fine *anicut* (dyke) thrown across the river by the Hindoo princes of Bijanugger, is seen a bed of gneiss penetrated by veins of porphyritic granite, containing much pink felspar in large semi-foliated crystals; and here and there nests of hornblende and mica. The strata of the gneiss are waved and bent.

A dyke of basaltic greenstone crosses the river bed in a westerly direction, compact at the edges: porphyritic towards the centre. The imbedded crystals are of light green felspar augite and hornblende.

Gneiss, granite, hornblende schist, and basaltic greenstone continue to Humpsagur, where the Tumbuddra is crossed, into the South Mahratta country.

*Rock basins.* The rocks in the bed of the river, both from Bijanugger and still farther east to Humpsagur, afford many instructive examples of the formation of rock basins by the action of water in motion, particularly below the *anicut* of Wallavapur, where the gneiss is full of them.\* The *anicut* itself is a stone dam, about twenty yards broad, thrown across the river so as to dam up its course, and to throw part of its water into the fields on either bank. On stone slabs in both wings of this *anicut* are inscriptions in the Hala Canada character, giving the date of its construction, viz. 1443 Anno *Salivahana*, (about 1521 A. D.), name of Cyclar year, *Vicrama*; in the month *Aswin*. Although the floods of this large river have washed over these inscriptions for upwards of three centuries, the characters of the inscription are perfectly distinct and legible.

*From Humpsagur to the Western Ghauts.* From Humpsagur the river crossed into the Darwar, or South Mahratta country, the geology of which by Gudduk and Dammul to the Western Ghauts, has already been described as consisting of granite and the hypogene schists, intersected by greenstone dykes.

From Cuddapah to Darwar the *Régúr* prevails, interrupted only when the rising of these rocks from the surface has covered their bases with a more recent alluvium resulting from their own disintegration.

*Ghauts West of Darwar.* The formation of the Ghauts W. of Darwar is the same as at Gairsuppa, and their western base to the sea at Goa is partially covered, as at Honawer, by a bed of laterite. Most of the surface buildings and fortifications of Goa are constructed of this rock, and it formed the thick walls of the once tremendous dungeons of the Inquisition, now lying prostrate. The startled snake and glittering lizard glide noiselessly away, scared by the sound of man's footstep among the rank vegetation which in many places chokes up the ruins.

\* For a description of the Rock basins of the Tumbuddra, vide Proceedings Geol. Soc. for 1841-42.

*On the Invention of the Armenian Alphabet.* By JOHANNES AVDALL,  
Esq. M. A. S.

If ancient Hellenic writers assign the palm to Cadmus for having been the inventor or introducer of the Greek letters, Haican historians of antiquity do bestow an equal distinction on St. Mesrop as the author or originator of the Armenian alphabet, the invention of which took place in the commencement of the fifth century, when this eminent divine flourished in Armenia, during the reign of Viramshapuh. Anterior to this period the Armenians used the Greek, Syriac and Persian characters. All their ecclesiastical and historical books were written in the two former, while the transactions of their courts of justice, as well as of their civil administration, were recorded in the latter.

Although it is true, as it will appear from what I shall have to state hereafter, that about a score of rude letters existed among the Armenians long before the day of St. Mesrop, yet their imperfection and consequent inutility was an insuperable bar to the cultivation of Armenian literature and to the advancement of knowledge among the sons of Haic. The disadvantage, attendant on the non-existence of a perfect and systematic alphabet, was deeply felt by the Armenian literati of that period. Lazarus Parphensis, a reputed historian of the fifth century, tells us that the books used in the national schools, were written in Syriac characters, and that the Armenian youths were, in consequence, subjected to great toil, perplexity and expense in the prosecution of their studies. The pious and the devout experienced similar difficulties in attending divine service, which was read and performed in books written in Greek or Syriac characters. This was certainly a source of great discouragement both to the pastors and the congregation, and at this the godly spirit of St. Mesrop was deeply grieved. The foregoing statement is fully borne out by the authority of Moses Chorenensis, who is justly termed the Armenian Thucydides, and is familiar to the learned of Europe by a Latin and French translation of his history of venerable antiquity. “Եւ ՚ի վարդապետեւ երանեւոյն Մեսրոպայ , ի՞նչ փոքր կրէր վաանգս , քանզի ինչն էր ընթերցօլ և թարգմանիչ . և եթէ այլ ոք հանդիպէր որ ընթեռնոյր՝ ուր նա ի՞նչ լինէր՝ զանխուլ ՚ի ժողովրդոցն լինէր յաղագս ի՞նչ լինելոյ թարգմանիչ : ” “Beatus autem Mesrobes non parvam molestiam

inter docendum ex eo cepit, quod ipse cum lector, tum interpres erat, neque a populo intelligi potuit, si quis fortè, eo absente, legisset, quoniam quidem non aderat interpres." *L. III. Cap. XLVII.* The heart of St. Mesrop burned with a holy desire to translate the Scriptures into the Armenian language, but the want of a perfect alphabet operated as a check to the attainment of the great object he had in view. This insurmountable obstacle tended, in no small degree, to the revival of paganism in some parts of Armenia, the inhabitants of which had embraced Christianity. The mind of St. Mesrop, was, therefore, literally absorbed in the plan of systematizing and completing the Armenian alphabet, fully sensible that on the success of this important project depended the civilization and happiness of his countrymen. Moses Chorenensis, referring to the object in view, adds: "Վասն որոյ եղ 'ի մտի հնարել գտանել նշանագիրս Հայոց լեզուիս • և արկեալ զանձն 'ի պէսպէս ջանս՝ պէսպէս փորձիւք տաժանէր:" "Atque ob eam rem rationem iniit, quemadmodum Armeniacæ linguæ characteres inveniret; qua in re dum operam poneret, variis premebatur difficultatibus." *L. III. Cap. XLVII.*

St. Mesrop was eminent for his profound learning, and his knowledge of the Greek and Syriac languages. His unrivalled qualifications had obtained for him the appointment of Secretary to the King Viramshapuh. Having filled this situation for a certain time, he preferred the quiet of monastic seclusion to the bustle of public life. Urgent business induced Viramshapuh to sojourn in Mesopotamia, where the absence of his able and experienced Secretary, or of one equally competent to discharge the duties of his office, was a serious impediment to the progress of the transactions of his court. The use of Persian characters in public writings presented many difficulties. Hereupon, a priest or monk, named Abel, offered to the king to introduce Armenian letters, the prototype of which was said to be in the possession of a Syrian bishop, known by the name of Daniel. These letters are mentioned in the annals of ancient Armenian writers by the designation of Danielian characters, which, however inelegant and incomplete, were destined to be improved, systematized and completed by the genius of St. Mesrop.

It is thus evident that Armenian letters were extant prior to the fourth century, but these, like the Hebrew and Arabic alphabets, were

without vowels, the want of which rendered the existing consonants of little avail or practical utility. Koreun, another cotemporary writer, says, that the Danielian characters were considered insufficient to link syllables together, and to form words out of them. Hence these characters were allowed to sink into disuse, and in their stead, the Greek, Syriac and Persian alphabets were used by the Armenians of those days.

The Danielian characters were twenty-two, or, according to other writers, twenty-nine in number. The invention of the seven vowels, Ա, Ե, Ի, Լ, Դ, Ո, Ի is only ascribed by Asolik to St. Mesrop, while another historian asserts that he invented fourteen letters, of which seven were consonants, and the other seven, the foregoing vowels. Vardan, who flourished in the thirteenth century, says:—"St. Mesrop invented and introduced the Armenian alphabet, of which twenty-two letters are known by the designation of Danielian characters, which were, from time immemorial, extant among the Armenians. But these Danielian characters had become obsolete, in consequence of their being incomplete and insufficient to combine the syllables of words in the copious language of Haic. The Armenians were, therefore, obliged to content themselves with the use of the Greek, Syriac and Persian characters. St. Mesrop succeeded, by inspiration from above, in inventing fourteen letters, of which the form was seen inscribed on a stone by an invisible hand! This sacred gift he obtained on the mount Balu, as Moses had received the Divine tablets on the mount Sinai! To this day vestiges of the stone, bearing the miraculous inscription of the letters, are visible on that spot, which is held in veneration by the Armenians." That there were Armenian letters anterior to the Christian era, was ascertained beyond a doubt during the reign of the Armenian king Leo, when coins were discovered, bearing inscriptions commemorative of the sovereignty of pagan Armenian kings. But these letters were both inelegant and imperfect, and our modern Ezra, St. Mesrop, brought them to perfection.

The fact of the existence of Armenian letters, prior to the beginning of the fifth century, is further corroborated by the testimony of foreign writers. Philostratus, who flourished during the reign of the emperor Severus, and who enjoyed the patronage of the empress Julia,



thus writes in his history of Apollonius Tyanæus:—"A panther was once caught in Pamphylia, having round its neck a gold collar, on which were inscribed these words in Armenian characters, Արշակ Բանակի Երեսնակ, = *King Arsaces to the god Nysæus.*"

The improvement and perfection of the Armenian alphabet was immediately followed by the establishment of numerous elementary schools and colleges for the instruction of the sons of Haic in scholastic books written in their own characters. The Scriptures were also translated from the original Greek into Armenian, together with such select Greek works as were calculated to enlighten and elevate the minds of Armenian students. Thus a happy change was wrought, in the beginning of the fifth century, by the introduction of Armenian letters; and the reign of Viramshapuh, like the Augustan age, is considered as the golden era of the cultivation of Armenian literature.

The Armenian alphabet consists of thirty-eight letters, of which twenty-two existed, though in a rude form, prior to the Christian era; fourteen were invented by St. Mesrop, and two were borrowed from the Greeks in the twelfth century.

*The following are their forms, names, and sounds.*

Forms.	Names.	Sounds.
Ա ա ար	Ibe (as in <i>tribe</i> )	A (as in <i>father</i> )
Բ բ Բ	Bien, ..	B soft.
Գ գ Գ	Kim, ..	K. C. Q.
Դ զ Դ	Tah, ...	T soft.
Ե է Ե	Yetch, ..	Ye (as in <i>yes</i> .)
Զ ղ Զ	Zah, ..	Z or S soft.
Է է Է	E. ..	E (as in <i>met</i> .)
Ը ը Ը	Yet, ..	U (as in <i>us</i> .)
Թ թ Թ	Twoh, ..	T hard.
Ժ ժ Ժ	J. or Zh, ..	J. French, or as English S. in the words <i>pleasure, measure</i> .
Ի ի Ի	Inni, ..	I or E.
Լ լ Լ	Luine, ..	L.
Խ խ Խ	Khé, ..	Ch. German, or as χ Greek.
Ծ ծ Ծ	Dzah, ..	Dz.

*The following are their forms, names, and sounds, (continued.)*

Forms.	Names.	Sounds.
Կ Կ Կ ..	Ghien, ..	G hard.
Հ Հ Հ ..	Hwoh, ..	H.
Ձ Ձ Ձ ..	Tzah, ..	TZ soft.
Ղ Ղ Ղ ..	Ghahd, ..	Gh or as γ Greek.
Ճ Ճ Ճ ..	Je or Jde, ..	I or G soft.
Մ Մ Մ ..	Mien, ..	M.
Ծ Ծ Ծ ..	He or Ye, ..	H soft.
Ն Ն Ն ..	Noo, ..	N.
Շ Շ Շ ..	Shah, ..	Sh.
Ո Ո Ո ..	Wo, ..	Wo (as in <i>worthy</i> .)
Չ Չ Չ ..	Tchah, ..	Tch or Ch (as in <i>charity</i> )
Պ Պ Պ ..	Pe, ..	P.
Ջ Ջ Ջ ..	Tche or Ché, ..	Ch or Tch soft.
Ռ Ռ Ռ ..	Rah, ..	R hard ( as in <i>raft</i> .)
Ս Ս Ս ..	Sé, ..	S.
Վ Վ Վ ..	Viev, ..	V.
Տ Տ Տ ..	Tune, ..	T.
Ր Ր Ր ..	Ré, ..	R soft.
Յ Յ Յ ..	Tzvoh, ..	Tz hard.
Ի Ի Ի ..	Une, ..	U.
Փ Փ Փ ..	Pure, ..	P.
Գ Գ Գ ..	Ké, ..	K or Ch (as in <i>archangel</i> .)
Օ Օ Օ ..	O, ..	O.
Փ Փ Փ ..	Pha, or Fé, ..	Ph or F.

It is worthy of notice, that a beautifully lithographed folio volume on Armenian Caligraphy was published at Venice in 1834. In this interesting publication is given a great variety of specimens of the Armenian alphabet, in nearly thirty different forms, which must certainly excite the wonder of orientalists, and the admiration of the lovers of Armenian literature. A similar publication has, it appears, lately issued from the Armenian press at Vienna, but not a single copy of it has as yet reached us in India.

# JOURNAL

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*On the tenures and fiscal relations of the owners, and occupants of the soil in Bengal, Behar, and Orissa. By JAMES ALEXANDER, Esq., B. C. S.*

The word Zemindarree, in the time of the Moghuls, signified the particular extent of land over which one zemindar, or landholder, exercised jurisdiction ; the collection of the revenues of that district was one of the chief duties entrusted to him, and the object of the greatest importance to the state. The amount of revenue leviable upon it became the distinguishing character of each zemindarree, and it was the only matter regarding it of which a record was kept in the superior revenue offices. Although the area was entered in some of the registers, yet the information regarding this, or as to the peculiar boundaries or products of each tenure was very defective. When the Perpetual Settlement was effected under the British Rule in Bengal, Behar and Orissa, the same form of record was preserved, and to this day little more is known of a zemindarree than the amount revenue which it is bound to pay the state. For the actual collection of revenue, and better preservation of individual rights, more particular distinctions have become necessary ; but these will be more conveniently treated of under another head.

*Zemindar.* This officer, under the Moghul government, exercised powers as phoujdar, or chief of the armed force, collector of revenue, and civil judge in trifling cases. On the accession of the English, his

services were required only as a middleman between the state and the actual cultivators of the soil. Although the zemindar's office had become by use hereditary, yet it is uncertain whether he had any proprietary right in the soil itself. It was, however, found convenient to bestow this right upon him, in order that it might be available as a security for the payment of the revenues of the state ; and the zemindar is now regarded as the proprietor of his zemindarree as long as he makes good the Government revenue leviable from it. Should he fail to do this, his proprietary rights are liable to sale for the realization of the demand.

It was incumbent on the zemindar, in his character of collector of revenue, to account to the state for his collections ; his remuneration consisted in a per centage on his collections. The title to office having been received as a right, the same rule held good with reference to these emoluments, insomuch that the incumbents of zemindarrees were held entitled to their allowances or per centage even when they declined to perform the duties of their office by undertaking to pay the amount of revenue at which it was assessed.\* These allowances so set aside were called *Malikana*, and averaged about ten per cent. on the gross assessment of an estate ; expenses incurred in the management of an estate are either entered in the account current, and their amount deducted from the gross proceeds, or are regulated by a fixed allowance on their account : where this latter plan is adopted, they are calculated at from ten to twenty per cent. on the assessment.

The original title of the zemindar then consisted in his right to hold the lands under his jurisdiction, on condition of accounting to the state for the net proceeds after deduction of expenses and his own per centage allowances. It is evident, however, that the state had no alternative between placing implicit reliance on the accounts given in by the zemindar or testing them by an annual investigation or assessment of the lands, and that if such took place the value of the zemindarree was entirely dependent on the result. To obviate this, it was determined in the year 1790, under the local Government of Lord Cornwallis, that an assessment should be made of all estates, and that the amount so assessed should be the sum which Government

\* Shore's Minute, 18th June 1789, para. 202nd ; 18th September 1789, para. 2nd.

might demand every year, and that no further demand should be made for ten years : this period of ten years was subsequently increased to perpetuity ; and all estates, held under assessments so imposed, are called Perpetually Settled Estates, or Zemindarrees.

Various causes, however, have operated to prevent or impede the settlement of many zemindarrees. These are disposed of for shorter periods, and called Estates under Temporary Settlement. The condition of tenure of these is as in Perpetually Settled Estates, the payment of the Government demand ; but the period of tenure is limited by that of the lease under which it is held, and at the expiration of this the estate is open to re-assessment.

Confirmation by competent authority is essential to the validity of either a perpetual or temporary settlement.

It is evident, that when the yearly rent of a zemindarree became fixed in perpetuity, and the payment of it was the only condition of the tenure, the condition of the zemindar was materially altered ; instead of being only interested to the extent of ten per cent. in the increases upon the annual proceeds of his estate, he had a right to appropriate to his own use all surplus proceeds after defraying the Government revenue. Rapid improvements took place in all properties held under this fixed assessment ; the favourable returns from these, together with the lightness of the original assessment, have raised the incomes of proprietors so high, that the term *Malikana* is no longer applicable to the sums, which they receive in their character of zemindars. These are now designated, generally, as Proprietary Profits ; they consist in the net proceeds of an estate after deducting the Government revenue and the expenses of collection, and will of course vary very much in proportion to the capabilities of an estate, and the success of the management to which it is subjected.

A talook is a subordinate tenure within the jurisdiction of a zemindarree. Talooks were of various descriptions. In some cases the talookdar had obtained the fee-simple or proprietary right in lands composing their talooks, either from the zemindar or his ancestor, or directly from the state ; and his title was indefeasible as long as he paid the Government dues : in others, the incumbency of the talookdar in the subordinate tenure was prior to that of the zemindar in the larger ; in others, the zemindar had never any proprietary right in the lands of

the talook. In all these tenures it was ruled at the formation of the Perpetual Settlement, that the talookdars should have the privilege of entering into engagements, and paying their revenue directly to the state, and that they should be independent of the zemindar. Talooks of this class are called Independent, or \*Huzooree Talooks. In cases where the deeds under which the talook was formed only alienated the zemindar's title to collect the rents without conveying any proprietary right in the soil, or where it was evident from the form or wording of the lease that the zemindar contemplated the resumption of his title, the talook was considered dependent, and the rent of the talook was included in the assets of the zemindarree, and paid to the state through the zemindar. Under many circumstances, to be detailed hereafter, the rent on the talook was liable to enhancement on the part of the zemindar. It was however ruled, that neither loss nor gain on the rents derived from his subordinate tenures, could affect the amount of rent payable by the zemindar to the state. The rents of talooks were either increased or diminished, or new talooks were established at his own risk; and the civil court was in all cases the arbiter of his title to interfere with his talookdars.† With reference to the establishment of new talooks, it was laid down that he could not alienate lands for a period extending beyond that of his own incumbency; that this being conditional on the payment of Government revenue, any failure in this payment would render void his own title, and also that of all other tenants holding immediately under himself. The effect of this rule is, that on an estate being sold by auction for arrears of rent, all leases granted by the former proprietor since the Decennial Settlement become void, and the lessees liable to an enhancement of their rents under certain restrictions, which will be more fully specified hereafter.

The cultivators of the soil in India have acquired various titles and privileges, acquaintance with which is essential to understanding the revenue system. Indiscriminate use of terms has given this part of the

\* The word *Huzoor* signifying literally, *the presence*, is applied in India to designate the extant supreme authority in the land. The addition of a vowel affix gives it the form of an adjective, and thus a *Huzooree Talook* comes to mean a tenure having directly to do with the Supreme Government without intermediate lien, or intervention.—EDS.

† Clause 8, Section 15, Regulation VII. 1799.

question some appearance of intricacy: to obviate this, a mere detail of the titles will be given in this place, and the privileges obtained under those titles will be more fully considered when the rates of rent are discussed; for it is evident, that in the ryuttee as in the zemindarree tenure, the rent which it will yield is the distinguishing mark of each sort of tenure, and the only point about it to which interest attaches in a discussion on revenue laws. The exact meaning of the word *ryut* is not conveyed by the word cultivator; for a man may be a ryut without being a cultivator: neither is the word *resident* a proper translation, for a man may be a resident without being a ryut. By the word *ryut* is implied a certain relation towards the community of the village of which a man is a ryut, and towards the zemindar of that village. An artificer or shopkeeper may stand in these relations of citizenship and vassalage, although perfectly unconnected with the cultivation of the lands of a village: in pursuing his occupation or trade in another part of the country he will still call himself the ryut of the particular village, and the particular zemindar with which he is connected as a ryut. When he dissolves this connection and becomes the ryut of another village, his rank and title in his new location are completely changed. This discussion appears necessary, because it is not uncommon to observe great misuse of the word *ryut*, as a revenue term; whereas it is not, until connected with some other word implying employment in culture, that it acquires any value at all. Thus the terms *kudeemee* or *morousee* ryut do not imply a ryut possessed of any peculiar privileges, merely that his ancestors were ryuts in the village, even a *moccurreree* ryut may hold only the area of his homestead, and these are the most common sort of *moccurrereedars*. The proper definitions and distinctions are *khod-khasht*, *pae-khasht*, *moccurreree khod-khasht*, *morousee khod-khasht*, *kudeemee khod-khasht*, *moccurreree pae-khasht*, *morousee pae-khasht*, *kudeemee pae-khasht*. The several privileges which these various titles confer, will be discussed under the head of Rates. It will be necessary to observe, that the term *jote* is the word which may be most conveniently employed in expressing the land held by each particular ryut.

The rent of land is the hire paid for the use of it. The original contract was very much this;—the proprietor of the soil gave the use of it, and the cultivator gave his labor, and the proceeds

or crop were divided between them. Many causes, however, tend to disturb the primitive simplicity of this arrangement ; the degree of labor requisite to ensure a compensating return is liable to great variation. Labor is not the only capital needed : the implements of husbandry, cattle employed in agriculture, seed, the means of protection,—all require outlay, and it soon becomes a question, in what proportion this is to fall on the contracting parties ? The landlord must constantly observe his tenant to ensure his honesty, and the tenant is discouraged by the reflection that one-half of his labor must be bestowed for the benefit of another. The first step towards the adjustment of these difficulties is, generally, a variation in the proportion of the crop receivable by the landlord, calculated with reference to the contribution which he makes towards the joint capital employed in the cultivation, whether in the shape of seed, cattle, hired labor, or any thing else necessary to raising the crop. Where the cultivator contributes labor only, he receives somewhat less than one-half of the crop ; where he contributes both labor and capital, he receives more : the latter is most commonly the case in India, but even after the adjustment of the proportions due to either party, difficulties will still remain, in any scheme of partition. The two most important have already been noticed—the necessity on the part of the landlord, of constantly watching his tenant ; and the discouragement on the part of the tenant, in bestowing extra labor and capital. To obviate these inconveniences, the landlord allows the tenant to redeem the proprietor's share in the proceeds, and this gives rise to money-rents, or the payment of rents of money. Although a revenue officer in this country has generally the task of discovering and recording the rents actually paid, rather than that of determining what they ought to be ; yet it is important, that he should have some knowledge of the various causes which affect the adjustment of money-rents, and indeed his doing so is essential to his understanding the different tenures under which ryuts hold, and the rates at which they are assessed. Soil, stock, and labor, are all three necessary to the production of a crop : if these were all three contributed in proportions of equal value, it is evident that the hire of the soil should equal one-third of the whole produce ; but in agreeing to pay an unvarying rent the tenant ensures the landlord against losses by failures of crop, defective seasons, fluctuations in the value of grain and



labor, and relieves him from all the care and expense of watching over and transporting his own share of the produce. In order therefore to make an equitable adjustment in converting rents paid in kind into money-rents, every one of these points should receive attention; and although it is probable that these questions were not formerly understood in all their minuteness of detail, yet we find that in practice the cultivator discovered them as it were by experience, and limited his payments in money to the amount at which cash payments were advantageous or not hurtful to his interests:—and here it must be recollected that in the earlier history of a country the producer and consumer are more nearly on an equality with each other, that it is not until the increased possessions of the latter give him a monopoly over the land that he can dictate its price to the former; the careful recollection of this fact will afford material assistance in the consideration of the various rates paid by the different classes of cultivators in India. In discussing these it will also be necessary to bear in mind the distinction between the actual rate or *nerick*, and the various additions which have been made to it by the avarice of the landlords. This was formerly so well understood, that in the earlier discussions on revenue matters in this country we generally find the term *ussul nerick*, as distinguishing the actual rent or hire of the land from all extra demands made under other pretences. Although this distinction has been very much lost sight of, yet the careful analysis of the accounts of any zemindarree will shew the total demand of *dustúr* against the ryut is made up of the *ussul nerick*, and various other extra charges. Although these latter are discountenanced and invalid by law, yet the possession of a monopoly of a necessary of life will always give rise to the disposition to profit by it, and landlords in this country are not more disposed than in others, to place other limit on their desires than that which necessity imposes. The cultivator must have land, and he can afford to pay for the hire of it, the whole surplus proceeds remaining after the deduction of the costs of production, and a sum sufficient for his own maintenance. In England this is so well understood, that the capability of the tenant to pay is the only limit to the landlord's demand for rent. In this country ancient institutions, new laws, and large tracts of waste land, contribute to defeat the monopolizing tendencies of the landlord; but there is a constant struggle between himself and his tenantry regarding

the share which they are respectively to enjoy of the surplus profits of cultivation. In England there being no general laws for the protection of the tenantry, many landholders have at different times purchased peculiar privileges from their landlords, which have descended from father to son, and are in force to this day; the effective conditions of the judicial institutions rendering any attempt on the part of the landlord to set them aside, useless. The general laws in this country are well calculated to preserve to the cultivators all privileges, which ancient institutions or prescription without any special purchase or individual guarantee have conferred upon them; but various causes have prevented their taking advantage of the protection of these laws. Now, however the necessity of obedience of the law and executive power is becoming daily more apparent, and exactly in proportion as these assert and maintain their authority well, the peculiar privileges of the cultivator receive protection: hence also careful examination of them with a view of understanding what they are, becomes daily more interesting and important; as the *nerick* or rate of rent may be considered the index, or as it were test of the value of these privileges, they will come most conveniently under consideration in a review of the various sorts of rates which prevail in this country.

*Nerick moccurree.\** A fixed rate of payment secured to the cultivator under the guarantee of a written document; it is essential to the validity of tenure at a moccurree nerick, that the land had been held at fixed rates twelve years previous to the Decennial Settlement, that the payments should have been uninterrupted and uniform. Any failure of payment renders the lease void, and proof of increase of payments on former occasions is generally regarded as evidence, that the moccurree tenure has been broken up. Moccurree nericks established by zemindars, at any date less than twelve years before the Permanent Settlement, are liable to be broken up on the sale of the estate for arrears of revenue, unless granted for specific purposes, or proved not liable to increased assessment on the grounds stated in Sect. 51, Reg. VIII. 1793.

Leases conveying moccurree rights need not necessarily specify the rate of rent: they frequently record the total area and total rent, or

\* Sudder Dewanny Reports, Vol. I. page 102, "as no mention of a moccurree tenure occurred in an authentic document."

describe the external boundaries of the land, and mention the rent to be paid by the tenant; but documents of this sort will generally be found to bear dates antecedent to that of the Decennial Settlement; since then the practice of giving moccurree leases, except for special purposes such as the erection of buildings, &c., has fallen very much into disuse; where the grants have been made for specific purposes at fair rates, they are not liable to enhancement as long as the lands continue to be used for the purposes specified in the leases. These points are specified very clearly in Sect. 27, Reg. XII. 1841.

The right to cancel a moccurree tenure does not convey any title to oust the moccurreedar, but merely to assess his land at the discretion of the purchaser, who still retains his right of tenancy. (Vide *Sudder Dewany Adawlut*, vol. 1, 174.) It must be borne in mind, that the date of the Permanent Settlement is that on which each particular settlement received confirmation from competent authority. Although in the majority of cases this occurred on the same day with reference to properties situated in the same tract of country, yet enquiry on this point is always necessary inasmuch as there are many exceptions to the rate.

*Nerick Monroosee.* Fixed rates to which a title is established by inheritance. Although the term Meeras is commonly employed to denominate tenures at a fixed rent, yet taken by itself it conveys a title of very uncertain value, the heritage must consist of something to be inherited. If this be a lease guaranteed to the descendants of the lessee, the tenures should be more properly considered under the head of Moccurree, if it be a prescriptive title it should be considered under that head; it is possible that there may be an attempt to found a title on the fact of a series of undisturbed successions, the evidence to this, if not that of documents in the hands of the claimant must be obtained from the public records, or those of the zemindar; or it may be oral evidence assisted by tradition, but so many difficulties lie in the way of this sort of proof, that a Meeras will generally, as before remarked, prove a poor tenure unless supported by documents or prescription.

*Nerick-i-kudeem.* Fixed rates to which a title is established by prescription. The nobleman, under whose auspices the Permanent Settlement was completed, recorded the following observation on the right

of cultivators: "Unless we suppose the ryuts to have been the actual "slaves of the zemindars, every beegah of land possessed by them must "have been cultivated under an express or implied agreement, that a "certain sum should be paid for each beegah of produce, and no more. "Every *Abwab* or tax imposed by the zemindar over and above that "sum is not only a breach of that agreement, but a direct violation of "the laws of the country. The cultivator has therefore in such case an "undoubted right to apply to Government for the protection of his "property, and Government is at all times bound to afford him redress." This spirit pervades the whole body of law relative to the rights of the agricultural community. His Lordship again declares, "That the privilege which the ryuts enjoy of holding possession on the spots of "land which they cultivate so long as they pay the revenue assessed "upon them, is by no means incompatible with the proprietary rights "of the zemindars; whoever cultivates the land the zemindars can "receive no more than the established rent, which in most places is "fully equal to what the cultivator can afford to pay. The zemindars however may sell the land, and the cultivator must pay the rent to the purchaser." Now, although it is probable that any attempt on the part of the ryut to produce evidence of express agreement as to the terms of the original contract under which he broke up the soil, must fail, and although the nature of the implied agreement must have been dependent on so many circumstances, in which the lapse of time must have wrought such a change as to leave no trace by which to assist the formation of the judgment regarding them, yet evidence will be generally procurable as to what the rate has been, and in the absence of all proof to the contrary, it is assumed that this is what it ought to have been; and the fact of having held this rate confers on the cultivator a prescriptive title to continue to do so, and in this way a title to hold rates fixed by time and custom constitutes a good and valid tenure. Then again this title to hold at established rates, may be attached to particular spots of lands, particular villages, particular classes in a village, particular divisions of the country, or peculiar local custom. The first, and in some respects, most valuable is the right to hold particular spots of land on payment of a rent fixed by custom; the land so held constitutes what is known by the name of, Mokuddum ryuttee jote, (answering

very much to our English copyhold \*) is transferable by sale, and is undefeasible as long as the rent is paid. In Central Bengal where the introduction of Indigo has raised the demand for land, and the presence of Europeans has given greater stability to the interests of cultivators, these jotes are recognized as valuable properties, and are transferred from hand to hand by sale or mortgage solely at the pleasure of the *jotedar* without reference to the zemindar, who has no claim except for his rents. In Eastern Bengal where land is more abundant in proportion to the demand, and where the system of underletting exposes the ryut to the ever varying aggressions of new farmers, if confidence in the stability of the rates is not so strong, and tenures held under prescriptive title have not the same value as marketable commodities, neither will the cultivator himself incur the risk of any extensive outlay in the formation of gardens, the excavation of tanks, and the building of houses, unless under the additional guarantee of a lease or other document. The estimation in which it is held in the market, however, does not affect the real validity of the title ; a tenure under rates established by prescriptive usage is valid in Eastern Bengal as elsewhere, but there are not the same facilities for asserting it as in Central Bengal, where it has been already recognized as a transferable property.

*Nerick Monxa-waree.* Prescriptive usage has in some places given the inhabitants of a village a title to cultivate the lands in it at the rates established for each peculiar class of soil ; this title acquires its validity from the inability of the zemindar to levy more than the established rates ; he sues a ryut for land which he has cultivated without entering into engagements, although duly served with a notice, under Section X. Reg. V. 1812. The cultivator in defence states, that that notice raised the rates above those of the village ; the questions then to be determined are, what are the village rates, and what title the ryut has to the enjoyment of the privilege of cultivating at those rates ? The first is regulated by such evidence as may be procurable ; the second depends very much on local usage ; the nearest approach to a general rule is, that the cultivator if not duly served with a notice to enter into fresh engagements, cannot at the end of the year be called

\* Vide Vol. IV. *Sudder Dewanny Adawlut*, 274.

on to pay more than he paid the two preceding years, and that a cultivation of two years' standing is necessary to give him a title to cultivate at the village rates. There is an apparent difficulty, as to whether the cultivation must be of the same spot, or whether the title holds good in the event of any change, but the fact in practice is, that cultivators will never break up new or even fallow soil except at reduced rates: so that the question generally arises in the third year of cultivation, when, the particular spot of land in dispute having become a valuable holding, the zemindar wishes either to dispossess the tenant and let his land to another at increased rates, or to obtain those increased rates from the occupant, who then, in the absence of other title, claims to hold at the same rate as other cultivators in the village, or at the village rates.

The *Nerick-i-Mukuddum* is a rate established in favor of particular individuals, who claim to hold land at rates below those of the village, as a privilege of caste or office; where there is sufficient evidence to prove that this title has been previously recognised, it acquires a force from prescription which is not easily set aside, but it has been generally conceded by the zemindar rather than admitted by Government, or the Courts; but still in practice it will be found, where there are Rajpoots in the same village with Goallas, Keorás, and Chamars or other low-caste men, that they hold their lands on more favorable terms than these latter; the alleged reason is, that the Rajpoot cultivator is compelled to employ servants, who see the whole of the labor is performed by the lower caste cultivators with their own hands. It has already been remarked, that this title must be recognised with caution.

The *Pergunnah-waree Nerick* is resorted to, to check the *Mowza-warree Nerick* in cases where the latter cannot be determined by evidence, or when the proper assessment of a village hitherto held at an inadequate rent requires re-adjustment. It is the prevailing rate in the *pergunnah*, a well known revenue division of the country.

The *Bundoobustee Nerick* is the rate recorded by an officer deputed under Reg. VIII. 1822, to effect the settlement of an estate as the proper *Nerick* of the place; it ought to be either a mere record of the prevailing rates fixed with reference to the various titles under which the different cultivators hold their land, or of the rates determined by

himself with due reference to the prevailing pergunnah rates. Rates thus established are under the provisions of Section XI. Reg. VII. 1822, fixed for ever, as far as concerns the ryut holding under them at the time of settlement; neither can this in propriety be questioned in the Civil Court.

*Jungle-booree Nerick.* The rate at which cultivators enter into engagements to bring jungly land into cultivation. These of course depend on the terms of the specific contract entered into. It may be useful to notice the various circumstances which may affect this. These are, the density of the jungle required to be cleared, the situation of the land with reference to markets, public thoroughfares or rivers, the demand for land in the neighbourhood, the means of irrigation, the quality of the soil and water, the aspect of the ground, and the healthiness of the climate.

*Nayabadee Nerick.* The rate at which cultivators enter into engagements to bring waste lands into cultivation; the above remarks are very much applicable to it also.

*Bheetee Nerick* is the rate at which land for building is let. It is generally fixed on each house, and is determined by the eligibility of site, the extent of population, and similar causes; in almost every case former payments will be the only satisfactory evidence regarding this rate.

*Nerick Baghan, Nerick Phulkur.* These two rates appertaining to orchards or gardens may be considered together. As some outlay is necessary for the preparation of a garden, the cultivator generally secures himself by obtaining a lease of the ground beforehand; where he fails to do this, and has no prescriptive rights in his favor, the zemindar claims some proportion of the produce; even where this is as low as one-fifth, it is disadvantageous to the ryut, as orchard land requires great care in cultivation, and yields exceedingly high returns. A grove of mango trees standing on five acres will yield four or five hundred rupees if situated near a public road; in like way the produce of betel gardens, or pawn gardens, is of such value that the highest rate of money rent, will seldom equal more than one-twentieth or twenty-fifth part of the assets. With all these rates the evidence of past payments, or the payments in adjoining fields or properties is the best guide for determining what ought to be paid in each particular case; where evidence on this head is not procurable, great caution must be

exercised in calculating a money rent from an estimate of raw produce. It will be of importance to ascertain from evidence what proportion of this produce local custom assigns to the zemindar, and then carefully to bear in mind the fluctuations of markets, seasons, price, and other points before noticed in the discussion on money rents.

*Nerick-i-Deh.* In parts of the country where the villages are built in rows or streets, and the houses clustered together, the value of all lands is somewhat affected by their degree of proximity to the village, but the fields in the immediate vicinity of the houses are of peculiar value from the facility with which they are guarded, and the opportunity afforded of irrigating these from the village wells. These are called Deh lands, and are devoted to the more valuable crops, poppy, spices, tobacco, sugar-cane, and all others which require irrigation and watching. The rates on these are proportionate to the advantages conferred by position, and will generally be found recorded in the village accounts; where these are not procurable, nor appear trustworthy, evidence of former payments on cultivators of similar land will afford some guide as to what the rates ought to be. In adjusting a money rate, reference must be had to the amount of labor bestowed in raising and gathering the crop, more particularly the latter, when it consists of opium or spices.

*Nerick Muteherfa.* In Behar, the cultivating classes do not pay ground rent for the spaces occupied by their houses; this however is levied from artizans, and shopkeepers and other residents not cultivators, under the head of Muteherfa. In Bengal the word *Chandnee* is more commonly used for this peculiar class of rent; local usage, village accounts, and evidence of past payments, will afford the best guide in deciding claims regarding this rent. In adjusting a money rent, it is necessary to consider what are the advantages obtained, and what is included in the rent, such as a right of wharfage on the banks of a River, of frontage in a Bazaar, or of participation in the commercial privileges of the place in a large town; all which will affect the rent materially, and will, under peculiar circumstances, raise it to nearly 500 or 1,000 per acre.

*Nerick-i-Bhatai*, is the rate or proportion at which the rents of land are levied in kind. Where the simple word *Bhatai* is used, the produce is usually divided into two equal shares, of which one is



appropriated by the tenant, the other by the landlord ; it is occasionally, however, levied in other proportions, such as one-fifth and four-fifths, two-fifths and three-fifths, one-third and two-thirds, or such other proportions as may be determined on.

*Nerick-i-kutnee.* This is rather a legal term than an absolute rate. Where disagreement exists as to the terms of divisions, or when the landlord neglects to assess the standing crop, the cultivator cuts it at his own risk, and if he fail to satisfy the landholder, the latter brings an action at the *Nerick-i-kutnee*, stating that the crop having been cut he had no means of assessing it, and therefore sued the cultivation at the full value of an average crop ; this value is generally laid at twenty maunds per beegah of the standard of Akbur. It becomes necessary to determine through whose neglect no assessment was made, what the terms of cultivation were, what the actual produce was, what the Bazaar rates were at the time of cutting, and what the expenses were ; the titles advanced by the cultivators may be just the same as in the case of money rents, evidence of the same nature may be resorted to.

*Nerick-i-kunkoot.* This again is a legal term. The landlord in order to save the expense of watching the crop from the time of its cutting to its being thrashed, assesses it when standing, obtains from the cultivator an acknowledgment of the assessment mutually agreed on, and by this the accounts are subsequently adjusted. Where disputes subsequently arise regarding this, an action is brought, *Kunkoot ke nerick se*, or *Kunkoot ke hisáb se*, to determine what the assessment was, or ought to have been ; if no written acknowledgment was entered into, or if it is disputed, oral evidence regarding the particular crop or those round it is generally all that is procurable.

*Nerick-i-khaneh shumarree.* Where cultivation extends over hills or places not easily accessible for purposes of assessment, revenue is assessed on the families or the males of each family ; this mode of taxation is rapidly disappearing. It may be observed here, that tenures which lapse by dereliction or through default of heirs, revert to the zemindar ; if a cultivator dies heirless, the zemindar may dispose of his tenure to the best advantage to himself, but if a new cultivator obtain possession without any stipulations as to rent, and retain it for two years, he cannot be ousted, but his title is not to hold the land at

the same rates as the former tenant, but at the village rates. If a ryut be absent from his cultivation, he may continue his title to it by payment of the prescribed rent, but should balance of rent remain unpaid at the end of any year, the zemindar may proceed against him under the provisions of Sec. XV. Reg. VII. 1799, and having obtained a decree oust him, under Sec. XVIII. Reg. VIII. 1819.

*Nerick-i-Bunkur* is the rate paid for the privilege of cutting wood, grass, or similar products from particular localities; it is occasionally paid in the shape of rent for the ground occupied, occasionally in that of the price of the articles carried away. Generally a particular tract of country yielding Bunkur produce is let at a fixed rent to a farmer, who levies imposts from the men who carry away the different products, according to the quantity which they take; the first description of rent will be dealt with simply as any other farm, the second affecting the interests of the ryuts will depend very much on local usage; although it is doubtful whether this can ever have been so completely established as to constitute any prescriptive right to a fixed rate. In fact it is generally levied rather as a toll at the different points of export than as rent, and it does in reality differ from rent, as being rather the price of the article produced, than merely the lease of the hire of the land, although this latter is included in the price, the land being occupied in the production. Nature herself is the labourer, and the fortunate landholder is permitted to enjoy the fruit of her toils; but Nature contenting herself with production, has left the appropriation or reaping to man; and generally speaking, the labor of collecting and conveying spontaneous produce is far greater than of reaping a crop which is the result of cultivation; and this labor which has before been mentioned as calculated to affect rent, will materially influence that of land yielding Bunkur produce. The two distinct operations of collecting and conveying, are frequently performed by different classes of labourers; where this is the case, the landlord avails himself of the occasion of the transfer from one to another, as a convenient opportunity of collecting his rent, and perhaps of taking some from each party. The woodcutter brings his log of timber or bundle of bamboos to the purchaser at the outlet of the estate, whatever it may be, the ghat or pass in a mountainous country, the river or roadside in a forest, or an alluvial chur; the purchaser takes it from each individual, paying some

portion of the price to the landlord, and adding a small sum on his own account for the privilege of storing his purchases on the property until they are completed ; the rent here includes the hire of the soil, the value of the product, and in addition to it is charged a rent for the ground on which the collected store is deposited, pending transit. Bunkur literally signifies wood or belonging to the forest, but mineral products, generally speaking, found in woody places, all go to make up Bunkur rents ; that is to say, they form part of the assets on which the rent of a Bunkur farm is calculated, such as chalk, coal, stones, chunam : these again have separate subdivisions, but the principle on which the rent is to be calculated is the same. With reference to the two latter, labour is bestowed not only in the collection of the article, but in its preparation for the market ; this preparation consists in the reduction of the bulk, and the landlord compensates himself for what he loses in not taxing it in bulking by participating to a certain extent in the increased value of the article after it has undergone preparation. For the manufacture of the limestone into lime he makes a charge for the wood consumed in the heating of the kiln, and for the kiln itself ; as he has the power of dictation, he generally prefers avoiding the risk of failure from injudicious heating, by taking the kiln according to the quantity of lime which it is estimated to yield rather than wait for the lime itself, hence this rate is generally levied on the kiln at so much per hundred maunds. Bunkur rates being generally levied as a toll, disputes regarding them seldom come before the Revenue Courts, except when disputes arise between the landholder and farmer, and these will of course depend on the terms of the lease. A Bunkur ryut is seldom a resident on the estate ; in fact, Bunkur estates are generally unfitted for continued residence ; the want of scientific knowledge by which to avail itself of the treasures of the hill and forest have served to depreciate the value of Bunkur property in the estimation of natives far too low : as the products become of more importance, laws will become necessary for the protection of each peculiar class, instead of their being left now in indiscriminate confusion, all classed under one unmeaning title, Bunkur.

*Nerick-i-churhaie*, the rate of rent paid for the right of pasturage in extensive forests on waste lands. Trials will come before the Revenue Courts, rather regarding the right to levy, than the rate

at which the levy is to be made. In deciding cases, care must be taken lest the plaint, and the whole proceedings be fictitious, and lest there be collusion, the object being to establish a title by obtaining proof of having collected, or having been declared entitled to collect, or with a view of evading the resumption laws.

*Nerick-i-julker*, is the rate of rent paid for the right of fishery in particular waters; it is levied generally at so much a boat, and is modified according to the description of net used. Local usages prevail with reference to this rent, differing in almost every river, and every bend of each river; but litigation is less frequent with reference to these than perhaps any other class of rents.

Engagements to cultivate under a lease become void with the expiry of the lease itself; but if the zemindar instead of ousting the ryot at once, serve him a notice for the enhancement of his rents under the provisions of Reg. V. 1812, the service of the notice brings the case under the jurisdiction of the Revenue Courts, and if a balance remain unpaid at the end of the year, the zemindar cannot plead this balance as giving him a right to oust the cultivator under the provisions of Section X. Reg. IV. 1840, before the Magistrate; but having brought himself under jurisdiction of the Revenue Court, must sue for it and obtain a decree under Section XVIII. Reg. VIII. 1819. The occupancy for the year without opposition by the zemindar would appear to give the tenant a title from sufferance, which is defined by Blackstone: "Where one comes into possession of land by a lawful title, but keeps it afterwards without any title at all, as if a man takes a lease for a year, and after a year is expired continues to hold the premises without any fresh lease from the owner of the estate:" and the reason is, because the tenant being once in by a lawful title, the law (which presumes no man in the wrong) supposes him to continue upon a title equally lawful, until the owner of the land prove it to be wrongful. Now the Magistrate can only support the zemindar in the exercise of undoubted rights; he by his own neglect suffered a certain cause for doubt to supervene, and must clear it away by suing for any balance of rent as by his notice may remain due at the end of the year; at the end of the second year the cultivator has acquired a title of settlement since the expiration of his lease.

A resident cultivator considering himself aggrieved by ejectment, has a right to a trial of his grievance. If the ejectment be accompanied with violence he may apply for redress to the Magistrate, who besides inquiring into the violence, will on plaint being made under Reg. IV. 1840, call on the zemindar to prove his claim to the exercise of the right of summary ejectment, and should it appear that the cultivator had no claim, he will permit his summary ejectment; but should the case appear to be of the nature of those above described, he will either maintain the cultivator in possession, or stay the zemindar from disposing of the lands for a fixed period, within which he will instruct the cultivator to bring an action to try the ejectment under the 5th clause, Section XVIII. Reg. VIII. 1819, and the construction put upon it by the Circular Orders of the Dewannee Adawlut, dated 15th November 1833, which states that, "The declaration that it is illegal to oust resident cultivators except under circumstances, necessarily implies a remedy in case of the contravention of the rule, &c. &c."

The general laws of the country, if fully enforced, afford a degree of protection to the cultivator which is rather weakened than strengthened by a special contract or lease; even in the formation of new settlements the cultivators will be found unwilling to enter into written engagements, they have a sort of instinctive feeling that it is not their interest to do so; and they dislike the signature of the counterpart of a lease, which renders obligatory on them the annual payment of sums for the realization of which they have no security but the crop dependent on the contingencies of the season: in settlements besides the general laws of the country in their favour, they have the special protection afforded by Section XI. Reg. VII. 1822, and are well aware that if unable to assert their privileges under those general laws, that the mere possession of a pottah will not render them much stronger, but will have very much the effect of a special bond for a portion of a debt, which without affording any additional guarantee for the payment of the amount included in it, serves to throw doubt on the remainder which is excluded, and will tend to deprive them of the benefit of the protection to be derived from the general law with regard to any privileges not enumerated in it.

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*Notices and Descriptions of various New or Little Known Species of Birds.* By ED. BLYTH, Curator of the Asiatic Society's Museum.

[Continued from p. 212, ante.]

After the first part of this article was consigned to the press, an opportunity occurred of looking over Gould's magnificent 'Birds of Australia,' up to the nineteenth number of that work; and a few of the notes I took from it, bearing on the Ornithology of India, may here be introduced.

Among the *Falconidæ*, a second species of my genus *Butaëtus*\* (ante, p. 174,) occurs in the *Aquila morphnoides*, Gould, P. Z. S. 1840, p. 161; and the slight enlargement and elongation of the central occipital feathers recurs in it, which I mentioned to exist in fine specimens of *B. pennatus*. *Falco hypoleucos*, Gould, (ibid.), which that naturalist considers to be the Australian representative of the Jer Falcon of the north, is very closely allied to *F. jaggur* of India, from which it only appears to differ in having a dark forehead, no trace of supercilium, and the broadly white patch on the cheeks greatly diminished. *Milvus affinis*, Gould, the common Kite of Australia generally, excepting Van Diemen's Land, appears to be quite identical with *M. govinda* of India; but in that case the cere and feet are coloured too deeply: I can perceive no other difference whatever. *Elanus axillaris* (v. *notatus*, Gould,) is certainly distinct from *E. melanopterus* of India; and a beautiful new species is figured as *E. scriptus*. I am also informed by Mr. Strickland, that the American *E. dispar* has the tail wholly white, and a smaller beak than *E. melanopterus*: so that four species of this generic form are now established. A South African specimen of *E. melanopterus*, in first plumage, presented to the Society by Lord Arthur Hay, appears to me to be identical with the bird of India, although his lordship inclines to a different opinion.

In the *Athene strenua*, Gould, we have an Owl of the largest size, yet strictly pertaining to this genus of (generally) very diminutive Owls: and the *Athene ? connivens*, (Lath.) Gould, *Ath. maculata*, (V.

\* This name must yield to *Hieraëtus* of Kaup (1844); which I learn from Mr. G. R. Gray's extremely useful illustrated work on the genera of birds, seventeen numbers of which are now before me, and from these I shall have occasion to append some notes to the present paper. Mr. Gray merges *Hieraëtus* in *Aquila*.

and H.), and *Ath. boobook*, (Lath.), evidently pertain to Mr. Hodgson's genus *Ninox*.\*

*Caprimulgus macrurus*, Horsfield, is figured as an inhabitant of Port Essington, in North Australia; and the species would seem to be the same as that which I have referred to *macrurus*, p. 206, ante: the general colour, however, would appear to be scarcely so dark as in the Malacca specimens, and I do not understand the second white mark represented upon the breast of the male. The two sexes are figured, both having the white marks on the wings and tail, but diminished in extent in the female: and looking to a series of specimens of the nearly allied *C. albonotatus*, it would seem that the females vary in this respect, many having certainly more or less of this white, which confirms Captain Tickell's statement of the sexes of this bird resembling each other. In the common small *C. asiaticus* of India, the male and female appear always to resemble; and I now suspect that this will prove to be not unusually the case in *C. albonotatus*, *C. macrurus*, and *C. mahrattensis*.†

To the genus *Collocalia*, Mr. Gould erroneously refers two species of true Swallow, allied in nidification as well as plumage to *Hirundo capensis* and *H. daurica* (v. *erythropygia*); and a third Swallow is figured by him as *H. neoxena*, which appears to me perfectly identical with a specimen of *H. pacifica*, (v. *domicola*, Jerdon,) from the Neilgherries. A new *Cypseline* genus—*Atticora*—is founded on *Hirundo fasciata*, Gm., and two or three other South American species, to which is added one Australian representative as *At. leucosternon*.‡

\* This group *Ninox* is not admitted by Mr. G. R. Gray, who refers as many as forty-four species to *Athene*! I certainly consider the former to be a good division.

† It may be here remarked, that *Cuprimulgus indicus* is far from being so rare in Lower Bengal as I formerly supposed; inasmuch as specimens may be often procured in the Calcutta Botanic Garden. *C. monticolus* will also probably turn out to be far from scarce when I come to discover its proper haunts, which I suspect are upon open ground. The only two specimens of the latter which I have obtained were both caught alive by bazar shikarrees. Among Sir A. Burnes's drawings is a figure of a species, (from "Lakat,") nearly allied to *C. monticolus*, but still more uniform in its colouring which approaches to sandy,—this being a tolerably sure indication of the prevalent hue of its haunts;—but if correctly figured, (and it is stated to be "natural size,") it would be a smaller bird than *C. monticolus*, having the wing but nine inches and a quarter long. A skull and feet in Burnes's collection are, however, quite undistinguishable from those of *C. monticolus*.—The Society has just received another closely allied species from Java.

‡ Mr. G. R. Gray refers *Atticora* to the Swallow group; but I have little doubt that he is wrong. Not only is the whole appearance of Mr. Gould's figure of *At. leucos-*

*Acanthylis caudacuta* (v. *australis*), p. 211 and note, *ante*, would seem identical with the Himalayan species, only the middle of the back is represented scarcely whitish enough, and the Australian bird is figured to have a white mark above the bill, which does not exist in the Society's Himalayan specimens: but as the nearly allied *Ac. gigantea* varies in this respect, as shewn by specimens in the Society's museum, it is evident that no importance can be attached to this slight difference.\*

*Cypselus pacificus*, (Lath., v. *australis*, Gould,) p. 212 *ante*, from Penang, accords minutely with Mr. Gould's figure of an Australian specimen (except that the chin is not so purely white), and it may therefore be considered as rightly determined.

The *Totanus glottoides*, Vigors, is still regarded by Mr. Gould as distinct from *T. glottis*, and is figured by him as Australian: so also is *Coturnix chinensis*, which is common in parts of India, and seems to be found through all the intervening countries into Australia; and Mr. Gould admits it doubtfully into his Australian genus *Synoicus*. To *Hiaticula nigrifrons*, (Cuv.), v. *melanops*, (Vieillot), must be referred the *Charadrius russatus* of Jerdon. *Hæmatopus longirostris* of

*ternon* quite *Cypseline*, but he has distinctly represented *ten* tail-feathers, of very *Cypseline* character: whereas all the species of the Swallow group have invariably twelve tail-feathers.

*Hirundo neoxena* Mr. Gray identifies with *H. javanica* of Vigors and Horsfield, referring them both to *H. pacifica* of Latham; and *H. domicola*, Jerdon, will come in as another synonyme: but *H. jewan* of Sykes is considered by him to be the true *H. javanica* of Sparrman, though I suspect its true name will be *H. gutturalis*, Scop., v. *panayana*, Lath.; an identification I owe to Prof. Behn. Mr. Gray agrees with me (I may even say as a matter of course) in referring Mr. Gould's two supposed species of *Collocalia* to true *Hirundo*.

Of *Collocalia*, Mr. Gray enumerates four species, viz. *C. esculenta*, (Lin.), *C. nidifica*, (Lath.), *C. fuciphaga*, (Thunb.), and *C. troglodytes*, G. R. Gray, which last he has figured. The Nicobar species which I referred to *C. esculenta*, appears to be the *fuciphaga* of Dr. Horsfield's list, but not of Shaw; the latter approaches much nearer to *C. concolor*, (Jerdon), which last will, I suspect, bear the prior name of *brevirostris*, McClelland, *P. Z. S.* 1839, p. 155. The Nicobar species (true *fuciphaga*?) is of the same size as *C. troglodytes* figured by Mr. G. R. Gray, but has a much larger head than is represented in that figure (doubtless incorrectly), and its upper-parts are dusky-black, slightly glossed with green and purple, the lower brownish with white abdomen. The name *fuciphaga* is, of course, an absurdity: and on perusal of my remarks on the composition of the edible nests (p. 210, *ante*), our contributor Mr. Laidley remarked to me, that he had arrived at the same result from chemical analysis, which shewed the constituent elements to be those of inspissated saliva.—The Society has just received the Nicobar species from Java.

\* *Ac. caudacuta* of Australia, and *Ac. nudipes* of the Himalaya, are enumerated as separate species by Mr. G. R. Gray.



Australia is distinct from the Indian Oyster-catcher, which has a much longer bill, and I shall describe it by the name *H. macrorhynchus*. *Himantopus leucocephalus*, Gould, of Australia and the Malay countries, occurs also in India, but is much rarer than *H. candidus*. *Nettapus coromandelianus* of Australia, as figured by Mr. Gould, agrees exactly, both in size and markings, with the common Indian species. In the genera *Hylacola* and *Calamanthus* (*Praticola*, Sw., 1837), a very close approach is shewn to the Indian *Pellornium* (vide *J. A. S.* XIII, note to p. 372); but the latter seems sufficiently distinct, being also a larger bird, with a longer bill than in its Australian affines.\* Lastly, I shall only notice *Sericornis*, Gould, exemplified by his *S. citreogularis*, as a generic type to which a common Himalayan species (sent by Mr. Hodgson with the name *Tarsiger chrysæus*,) would seem to appertain.† The latter may be described as follows:

*Sericornis* (?) *chrysæa*, (Hodgson.) Length about five inches and a quarter, of wing two and three-quarters, and tail two and a quarter, its outermost feathers a quarter of an inch less: bill to gape three-quarters of an inch, and tarse an inch and one-eighth. Male having the entire under-parts, shoulder of wing, more or less of the scapularies, the rump, and basal three-fourths of all but the middle pair of tail-feathers, brilliant yellow; the last being also yellow at base, and there is a narrow supercilium of the same: rest of the tail, and the lores and ear-coverts, black: alars, and their larger coverts, blackish, narrowly edged with dull yellowish; and the head and back are dusky olive, with dull yellowish-green margins to the feathers: bill dark above, below pale; and the legs pale. In younger specimens, there is less yellow on the scapularies and wings: and the females have the whole upper-parts uniform dark greenish-olive, with merely a more yellowish shade over the rump; the under-parts sullied yellow; and tail dusky-olive, marked as in the male, but with considerably duller yellow. The young of the year differ from the female in being spotted above like a young Robin.

Mr. Hodgson informs us that this bird "inhabits the central hills of the Himalaya; is shy, solitary, and bush-loving, constantly descend-

\* In the sequel (p. 600), I have added a new genus to this group,—*Malacocincla*, nobis.

† Other species of *Sericornis*, however, figured by Mr. Gould, render this generic identification more doubtful.

ing to the ground from its perch : it feeds and breeds on the ground, making a compact saucer-like nest of moss. Eggs verditer." In form it comes very close upon *Calliope*, and approaches still nearer to *Cyanecula*, from which its principal structural distinction consists in the more rounded form of its wings and tail, and the somewhat reduced degree of firmness of its plumage ; besides which the yellow colouring is a character of the present group. The wings have the fourth, fifth, and sixth primaries subequal and longest, and the first about half their length.

Referring again to the first part of this paper (p. 182, *ante*), it may be remarked that Mr. Jerdon now considers the *Scops sunia* and *Sc. pennata* there described, to be different phases of plumage of the same species. Until I obtain further data, I shall refrain from adding to what I have already stated on the subject ; but may remind the naturalist reader, that I have described three distinct states of plumage of the *Sc. sunia*,—viz. the first or nestling garb, an intermediate dress in both sexes, and the mature livery which is almost uniform deep chesnut-ferruginous : so that the variation to grey would certainly not appear to be dependent either on age or sex.\*

Of *Syrnium niviculum* (p. 185), a second specimen has been obligingly presented to the Society (with numerous other valuable bird skins), by Mr. L. C. Stewart, of H. M. 39th Foot, believed to be from the Western Himalaya, where many of that gentleman's specimens were procured. It completely establishes the species, as distinct from *S. aluco* ; and it differs from the specimen already described in the general darker tone of colouring of its upper parts, occasioned by the greater predominance of the fuscous ground-tint, while the scapulary spots are whiter, and there is also an intermixture of white on the facial disk, and the lower parts are less tinged with fulvescent. It is probably a male, and the other a female.

With respect to the species of *Brachypternus*† (p. 194), I find that a third occurs in the Scindian representative of the common *Picus* (*Br.*) *aurantius*. With the dimensions of the latter, it differs from it in the reduced quantity and intensity of the yellow on the upper parts,

\* Mr. G. R. Gray identifies *Sc. pennata* with the European species, and adopts *Ephialtes*, K. and B., as the generic name.

† Lord A. Hay thinks, judging from recollection, that *P. micropus* is the common species of S. India, *P. bengalensis* apud Jerdon.

which is also quite free from any orange tinge, and the whitish markings on the wings are much more developed;—distinctions which hold true in both sexes. As I have elsewhere described the species, the present indication of it will here suffice.

I am also informed that the *P. badius* apud Jerdon, of S. India, differs alike from the true *P. (Micropternus) badius* of the Malay countries, and from *P. (M.) phæocephs*, nobis, of Bengal, Nepal, Assam, and Arracan. Accordingly, we now distinguish three species respectively of the subgenera *Micropternus*, *Brachypternus*, and *Tiga*; which certainly confirms the propriety of these groups being thus separated.\*

*Centropus* (p. 202). Lord Arthur Hay has obtained a very splendid bird of this genus from Malacca, which is evidently the *Cuculus bubutus* of Raffles's list, stated to be "not much less than two feet in length;" but it is not Dr. Horsfield's Javanese bird, described to be eighteen inches and a half long (*Lin. Trans.* XIII, 180), which is precisely the length of the Indian species (vide *J. A. S.* XI, 1099). This fine species may be appropriately termed

*C. eurycercus*, A. Hay: being particularly remarkable for the great breadth of its tail-feathers, each of which measures two inches and three-quarters across. Length about twenty-three inches, of which the middle tail-feathers measure half, the outermost being four inches and three-quarters shorter; wing eight and three-quarters; bill to gape nearly two inches (in a straight line), and three-quarters of an inch in vertical height, being much larger than in *C. philippensis*; tarse two and a quarter; the long hind-claw but an inch. Colour as *C. philippensis*, but the back and wings are of a brighter and more chesnut brown, and the tail is glossed with steel-blue instead of green. *C. philippensis* and *C. Lathamii* are also met with at Malacca, and both appear to be much commoner there than the present species. I have also lately received certain information of a *Centropus*, of the alleged size of *C. bengalensis*, (and doubtless that species,) occurring in the Calcutta Botanic Garden. My informant brought me *C. Lathamii* from the locality, and stated that he had often there observed the minute species, but was unaware

\* Mr. Jerdon writes me word—"The *Picus moluccensis* figured in the *Planches coloriées* is certainly distinct from that of Hardwicke and Gray: the former being of course true *moluccensis*, and I suspect the same as your *canicapillus*."—A Javanese specimen just arrived is very doubtfully distinct from that of S. India: and I may add, that in Dr. Cantor's Malayan collection is a superb fourth species of *Tiga*.

of its being at all a desideratum. It is therefore probable that I shall soon obtain specimens. (*C. bicolor*, Lesson, has just been received by the Society, with the specific name *celebensis*, probably of Temminck. It is a very distinct species.)

We may next pass to the paper on *Leiotrichanæ*, &c., and *Fringillidæ*, Vol. XIII, pp. 933 *et seq.*, to notice some further identifications which have occurred to me.

*Leiothrix furcatus*, v. *sinensis*, must be designated *L. luteus*, (Scopoli).

*Siva occipitalis*, nobis, (p. 937,) makes so considerable an approach in plumage and general character to the *Yuhina* ? *flavicollis*, Hodgson, *As. Res.* XIX, 167, that their near affinity is indisputable; and this brings the latter species, for which Mr. Hodgson now proposes the generic name *Ixulus* (vide sequel, p. 562), within the confines of the group of *Leiotrichanæ*, where the slender form of the bill approximates it to *Minla*, from which it is barely separable, and it thence carries on the series of affinities to *Yuhina* and also to *Myzornis* (*J. A. S.* XII, 984). The *Siva occipitalis*, however, differs greatly in the form of its bill from *Ixulus flavicollis*, that of the former being fully as stout as in *Proparus*, in which group it might very well be classed: and as regards other distinctions, the crown is tinged with rufous, the slightly reverted crest is less developed, the narrow blackish streak from the corners of the mouth does not occur, the under-parts are much more sullied or less whitish, and the wings are longer; yet, notwithstanding these various differences, the resemblance is at first sight not inconsiderable. It may be added, that the name *Certhiparus*, which Mr. Hodgson wishes to substitute for *Minla*, is objectionable on other grounds than as concerns the mere alteration; it having been previously applied (apparently by the Baron de la Fresnaye) to a group of New Zealand *Meliphagidæ*.\*

\* Vide G. R. Gray, in Dieffenbach's 'New Zealand,' II, 189 (1843). This naturalist, by the way, reunites the whole of Mr. Hodgson's divisions of *Leiotrichanæ* under *Leiothrix*; and he gives four species of *Pteruthius*, adding as a fifth the *Piprisoma agilis*, which has no sort of relationship to the group. The male of *Pt. rufiventer*, nobis, is beautifully figured, but the sexes of this species are so different, that the female should certainly have accompanied it. As for his mixing up the *Leiotrichane* birds with *Pardalotus*, *Pachycephala*, &c., I am quite of Mr. Strickland's opinion, that the group *Pachycephalinæ* so formed is an extremely forced and unnatural one; and that such is usually the case, when too little attention is paid to the geography of genera thus brought together.

The *Parus* (?) *minutus*, Jerdon, (p. 944,) is probably identical with *Erpornis zantholeuca*, Hodgson, XIII, 380. 210.

*P. nuchalis*, Jerdon, is a new species from Southern India. Length about five inches, of wing two inches and three-eighths, and tail two inches; bill to gape nearly half an inch, and tarse five-eighths. Colour black above, as also a broad mesial stripe from throat to vent; cheeks, sides of neck, and of the breast and belly, with the under tail-coverts, white; a white spot also at the nape, as in *P. ater*, &c., a band of the same across the wing, and the tertiaries very broadly margined externally and tipped with white; outermost tail-feather white, except its inner border, the next with the outer web and contiguous portion of the inner web white, and the third with the outer web white at tip and for most of its basal half: bill black; and legs plumbeous. Inhabits the Eastern ghauts.

Of *Ploceus philippinus*, (p. 944,) Mr. Strickland writes me word, that the Indian bird, and not Dr. Horsfield's Javanese species, is the true *Loxia philippina* of Linnæus. It extends its range to Malacca.

*Passer montanus* (p. 947,) proves to be the more common species of Sparrow in Arracan generally, about 60 of this species occurring to one of *P. domesticus*, var. *indicus*: Lord Arthur Hay has also received it from Malacca;\* and hence a doubt arises whether it be not the Siamese Sparrow mentioned by Crawfurd. *P. montanus* is also the common Sparrow of Afghanistan.

The division *Gymnoris*, Hodgson (p. 948), I shall now adopt, on the authority of a second species sent on loan by Lord Arthur Hay, and believed to be from S. Africa.

*G. superciliaris* (?), A. Hay. Length about six inches and three-quarters, of wing three and three-quarters, and tail two and a half; bill to gape eleven-sixteenths of an inch, and tarse three-quarters. Plumage as in *G. flavicollis*, with the same yellow spot in front of the neck; but there is no maroon colour on the shoulder of the wing, the anterior whitish bar crossing the wing is narrower, there is a conspicuous whitish supercilium, and the dorsal feathers have the terminal third of their inner web dull dusky-brown, imparting somewhat of the streaky appearance common to most Sparrows: the crown and upper portion

\* I hear that a Sparrow of some species, most probably this one, abounds in Singapore.—The Society has just received *Ploceus philippinus* apud Horsfield from Java.

of the ear-coverts are dark brown, contrasting strongly with the whitish supercilium : bill formed exactly as in the other species.

To *Amadina maja*, (p. 949,) should have been added, as a synonyme, *Loxia leucocephala*, Raffles. *A. acuticauda*, Hodgson, is the *Loxia molucca*, Lin., and will therefore range as *Amadina molucca*. Specimens from Malacca are perfectly identical in species with those procured in Nepal by Mr. Hodgson.\*

For *Erythropsiza* (p. 952), must be substituted the prior name *Carpodacus* of Kaup : and for *Corythus*, *Strobilophaga* of Vieillot.

*Carduelis caniceps* (p. 955). The Afghan specimen described, was in summer aspect of plumage, when the winter edgings to its feathers had been cast. Its length should have been printed *five* inches and three-quarters. One from the western Himalaya, in winter garb, is rather smaller, agreeing in length of wing with Gould's figure, and the plumage has a browner tinge, less relieved with white on the fore-neck and breast than in the Afghan summer specimen, or than in *C. communis* ; but the colour is much less dark than in Gould's figure, the red surrounding the base of the beak is also much less developed, and there is no black streak passing backward from the eye.

An oriental species of *Ligurinus*, or Greenfinch, exists in the *Loxia sinensis*, Lath., founded on the *Verdier de la Chine* of Sonnerat. It agrees in size, and in the Goldfinch-like marking of the wings, with *L. xanthogrammicus* of the Andes.

To the species of Bunting enumerated in pp. 957-8, may now be added

*E. melanops*, nobis. Length six inches, of wing two and seven-eighths, and tail two and five-eighths ; bill to forehead seven-sixteenths, and tarse three-quarters of an inch. Head, neck, throat and breast, dull green, paler below, and a little streaked with dusky on the crown ; lores, chin, and around the eyes, black ; belly and lower tail-coverts sulphur-yellow, the flanks greenish with dusky streaks : scapularies and inter-scapularies rufescent, with a black central streak to each feather ;

\* Lord A. Hay writes me word—" I have specimens of *Amadina punctularia* v. *nisoria* from Malacca, and they seem distinct from our Indian bird ; being much lighter-coloured, and the markings seem differently formed."—Should they prove distinct, the Indian species would perhaps rank as *Am. lineoventer*, (Hodgson :) but I remember comparing Malayan with *Bengal* specimens some time ago, and observing no difference between them.

the wings blackish, each feather margined with rufescent, palest at the tips of the greater and second range of coverts: rump plain rufescent-greenish: tail dusky, with the terminal two-thirds of its outermost feather white, except the final third of the narrow outer web; and about a third of the inner web of the penultimate feather is also white, obliquely separated: bill dusky, the lower mandible whitish except at tip; and feet pale. From Tipperah, whence a fine specimen has been presented to the Society by M. Courjon. This can hardly be the male of *E. sordida*, *J. A. S. XIII*, 958.

It may be that I was wrong in referring a Peshawur female in the collection formed by the late Sir Alexander Burnes and Dr. Lord, to the *E. icterica* of Central India, in *XIII*, 957; for both sexes of the Peshawur bird are figured in a drawing made under Sir A. Burnes's superintendence; and though the specimen has certainly every appearance of being the female *E. icterica*, the male is not represented to have any distinct rusty tinge on the head, which is nearly concolorous with the back, except that the *pale* yellow hue of the under-parts is made to surround the ear-coverts, and thence to ascend on the crown, posterior to the eye, so as to divide the brown of the crown from that of the occiput. Should it prove to be a distinct species, and not merely *icterica* represented indifferently, it might bear the name *E. personata*.\*

The following is a remarkable genus, the affinities of which have puzzled me a good deal, but (now that the Society's specimens have been mounted, and I can judge better of their characters,) I incline to think, with Mr. Hodgson, that it is really related to the Larks, though tending to assume the character of some of the *Crateopodinae*, as *Pellornium* and its allies, yet without being truly affined

\* Since writing the above, Mr. Stewart has favored us with many specimens of *E. icterica* from the vicinity of Agra, where the species appears to be very common; and the females seem to me to be decidedly identical in species with Burnes's Peshawur female, though the back is less rufescent. Burnes's specimen is, however, in old and worn plumage, whilst the Agra specimens have their feathers newly put forth.

I may likewise notice here, that Lord Arthur Hay has obtained *E. Lathamii*, male and female, from Hong Kong; the species certainly identical with the Indian one.

These, and all the other Indian Buntings which I know of, pertain to the division *Euspiza* of the Prince of Canino, at least according to the classification of Mr. G. R. Gray, which I am not altogether satisfied with. The type of *Euspiza* is *Emb. melanocephala* of Scopoli; which is distinct enough in the form of its beak.

to the latter. Mr. Hodgson terms it "a most interesting form, tending to relieve the insulation of the *Alaudinæ*."

*Heterura*, Hodgson. "Bill moderate, strong, compressed, straight, but with the culmen and compressure curved, and *gonys* ascending; its base clad with rigid plumes as far as the advanced *nares*, and the tip for the most part decidedly inclined and notched; *tomix* scarpt and trenchant: gape wide and hispid. Wing short, hardly passing the base of the tail, but *Alaudine* in all its details; the first and fifth quills equal, and somewhat shorter than the second, third, and fourth, which are longest; centrals notched; the tertiaries equal to the primaries. Tail rigid, somewhat gradated from sides as well as centre, and the separate plumes possessing the divaricate structure, with acutely wedged or hastate points. Legs and feet strong, ambulant: tarse plus the middle toe and nail, strongly scutellate to the front, smooth and cultrated to the back. Toes medial, compressed: the laterals equal; the central sufficiently long; the exterior basally connected to the mid one; the hind least: nails simple, fully curved.

"*Hab.* Hills only. Not very gregarious: frequent trees, and breed and feed on the ground."

*H. sylvana*, Hodgson. "General aspect and colours *Alaudine*, but the body below completely striped. Above brown-black, largely margined with ruddy-luteous [on the sides of the feathers]: below rufescent-luteous, immaculate on throat, but beyond it streaked centrally with more or less wide blackish lines; a dark moustache, and pale brow: lateral caudals more or less albescent: legs fleshy-green; bill horn-colour, with dusky ridge. Length seven inches and a quarter to seven and a half: bill eleven to twelve-sixteenths of an inch; tail two and three-quarters to two and seven-eighths; closed wing two and seven-eighths to three and one-sixteenth; tarse under an inch; central toe to nail thirteen-sixteenths, hind ditto eleven-sixteenths; weight an ounce." Inhabits Nepal.\*

I will next briefly review the *Nectariniidæ*, which were last taken in hand in Vol. XII, pp. 969 to 984, inclusive.

\* The *Coryphidea baghaira* (p. 961, *ante*,) is identified by Mr. G. R. Gray with *Alauda brachydactyla*, Auct.; and as this constitutes the type of *Calandrella*, Kaup, the species will accordingly range as *Cal. brachydactyla*. The form is quite distinct from *Alauda*, to which Mr. G. R. Gray refers it; as any one familiar with the living bird must at once acknowledge. Mr. Gray's Indian *Alaudæ* are in sad confusion.



To commence with the genus *Arachnothera* : my *A. latirostris* (p. 982) must be referred to *A. modesta*, (Eyton, p. 981) ; and of the other species briefly described by that gentleman, who erroneously referred them both to *Anthreptes* of Swainson, the Society has now received two fine specimens from Malacca, which may be thus described :

*A. flavigaster*, (Eyton). Length about eight inches, of wing four, and tail two inches ; bill to forehead one and three-quarters ; and tarse seven-eighths. Colour plain olive-green above, paler below, and yellowish on the belly and under tail-coverts : feathers around the eyes, and a tuft near the angle of the jaw, brighter yellow : bill dusky, paler beneath, and the legs have probably been bright yellow. A young specimen is smaller, with the wing three inches and five-eighths long, and the rest in proportion : the plumage is less compact, but the colouring of the upper parts is brighter olive-green, and of the abdominal region much brighter siskin-yellow : in other respects it is similar.\*

*Nectarinia mahrattensis*, (p. 978,) will bear, as its earliest specific name, that of *asiatica*, (Lath.) It is also the *Certhia mahrattensis*, Lath., and *C. saccharina* of Shaw.† The range of this species extends eastward into Arracan, where also the *N. Gouldiæ* is met with ; but not *zeylonica*, which is replaced by *Hasseltii*, as *asiatica* there begins to be by *flammaxillaris*, which last, in its turn, is replaced towards the Straits by *pectoralis*.

*N. jugularis*, Vieillot, apud nos, (p. 979,) is a new species, and may now rank as *N. flammaxillaris*, nobis : the length of its tail, misprinted “ under half an inch,” should have been given as under an inch and a half. The allied *N. pectoralis*, Horsf., is common at Malacca, and in the Nicobar islands : a specimen in spirit from the latter group measuring four inches long, by six in spread of wing.

*Nect. (v. Anthreptes) phænicotis*, (p. 979,) ascends so high as Tipperah ; and also certain other Malayan birds (as *Calornis cantor*‡ and *Brachypodius melanocephalus*) occur there, which do not appear to have been met with further to the west.

*Nect. Phayrei*, nobis, p. 1008, proves (as I formerly suspected) to

\* The Society has now two, if not three, additional species of this genus from Java, which require more study than I can at present bestow on them.

† *N. strigula*, (Hodg.) is the young.

‡ Lord Arthur Hay has pointed out to me some distinctions between the Tipperah and Arracan *Calornis*, and the closely allied species of the Straits.

be *N. Hasseltii*, Tem., and is common also at Malacca. It is the *Certhia sperata*, var., of Raffles's list.

*Nect. (v. Anthreptes) frontalis*, nobis. Differs from the female of *N. lepida (v. javanica)*, Horsf., in having the bill rather shorter; the upper parts of a richer, somewhat darker, and more aureous, olive-green; and the lower parts greenish-grey, without any yellow: the throat, and cheeks especially, inclining to be cinereous: the frontal feathers alone are scale-like, and of a brilliant steel-green. Length about five inches, of wing two and three-eighths, and tail two and one-eighth; bill to gape three-quarters of an inch; and tarse nine-sixteenths. From Singapore.

*Dicaeum chrysochlorum*, nobis, p. 1009, extends its range southward to Malacca.

*D. erythronotum*, p. 983, bears the prior name of *cruentatum*, (L.)\*

*D. Tickelliae*, nobis, is the *Certhia erythrorhyncha*, Lath., a name, however, which is too inaccurate to be retained. Young birds, when they leave the nest, have the beak of a flesh-red colour, except just the tip; and a specimen in this state is figured among Buchanan's drawings, with the reddish colour of the bill exaggerated; and it was probably upon a copy of this very drawing that Latham founded the species. Being the *Nectarinia minima* of Tickell (not of Sykes), it might therefore be termed *Dicaeum minimum*, (Tickell). The range of the species extends into Tipperah and Arracan.

*D. ignicapillum* of Eyton is the *Prionochilus percussus*, (Tem.) Strickland: and in form and colouring it bears much the same relationship to *Piprisoma agilis*, (Tickell) nobis, XIII, 395, that the bright-coloured Malayan *Dicaea* do to the dull-coloured species which alone inhabit the peninsula of India. To this genus *Prionochilus*, Str., P. Z. S. 1841, p. 29, are referred the various Malayan species which M. Temminck has strangely classed in *Pardalotus*, as his *P. thoracicus* and *P. maculatus*, in addition to the *percussus*: and the so-called *Pardalotus pipra* of Lesson's *Traité* (stated to be Himalayan<sup>^</sup>), upon which the latter naturalist has since founded his *Idopleura*, turns out to be

\* Dr. Horsfield informs me, in *epistolâ*, that the Javanese species which he referred to *cruentatum* is distinct from the Bengal one, or true *cruentatum*. It is probably, therefore, one the Society has just received from Java, which has the head, neck, throat, breast, whole inter-scapularies, rump, and upper tail-coverts, scarlet, wings and tail blue-black, and lower parts pale ashy, except the under tail-coverts which are white. *D. cruentatum* is common at Malacca.

South American; which satisfactorily disposes of all the Asiatic species that had been assigned by authors to the very peculiar Australian genus *Pardalotus*, warranting and confirming our suspicions in other instances, wherein the French naturalists more particularly have strangely inclined to disregard some of the most striking exemplifications of the geographical limitation of particular forms.

Two well marked species of *Prionochilus* are now before me, which may be described as follow :

1. *Pr. percussus*, (Tem.): *Dicaeum ignicapillum*, Eyton. Length about three inches and seven-eighths, of wing two inches to two and a quarter, and tail an inch and a quarter; bill to gape seven-sixteenths, and tarse half an inch. Colour dull lavender-blue above, the lower parts bright yellow, passing to whitish on the lower tail-coverts; a large igneous-red spot on the vertex, and another in the centre of the breast; and a white streak from the side of the lower mandible, divided from the yellow of the throat by another of the same colour as the upper parts. Bill black above, more or less whitish beneath; and legs lead-coloured. Mr. Eyton describes the female to be ashy above, with the under-parts yellow irregularly streaked with cinereous; and a red spot on the vertex. The young are olive-green above, paler below; and it is doubtful, from a specimen before me (which has advanced in its moult), whether there is either coronal spot, or more than a trace of one, or of yellow on the under-parts, in its first plumage. From Malacca.

2. *Pr. thoracicus*, (? Tem.) The appropriateness of the name leaves little doubt of this species being properly identified; and it is not unlikely that *Pardalotus maculatus*, Tem., refers to the female or the young. Length four inches and a quarter, of wing two and three-eighths, and tail an inch and a quarter; bill to gape half an inch, and tarse rather more. Head, neck, breast, and throat, black, with an igneous-red spot on the vertex, and a very large patch of the same on the middle of the breast; wings and tail also black, some of the feathers slightly margined with olive; back greenish-yellow, brightening on the rump, and becoming vivid yellow on the upper tail-coverts, and on the shoulder of the wing; axillaries, and fore-part of the under surface of the wing, white; and the remainder of the lower parts yellow, tinged with olive on the flanks. A presumed female has the entire upper parts olive-green, with an igneous coronal spot, less red than in the

male; a whitish streak from the base of the lower mandible, separated by an olive-green streak from the slightly yellowish white hue of the middle of the throat; and the under-parts yellow, brightest along the centre, and streaked laterally with olive-green; lores whitish, and the axillaries and under surface of the wing white, as in the male. A presumed young male is olive-green above, the crown ashy, with a central spot of olive-green; middle of throat white, its sides ashy, with no decided white streak from the base of the lower mandible: the lower parts are yellow, mixed with olive-green, and having an indication of the red pectoral spot of the adult male. Also from Malacca. The mature male here described is in the collection of Lord Arthur Hay.

The curious species described as *Pachyglossa melanozantha*, H., in *J. A. S. XII*, 1010, is thus characterized by Mr. Hodgson:

*Pachyglossa*, H. "General structure of *Myzanthé*\* (*J. A. S. XII*, 983), but much less delicate. Bill conspicuously short, thick, conic and blunt, with the gonys ascending strongly; yet typically denticulate on the tomial margins. Tongue as long as the bill, thick, fleshy, with cartilaginous bifid tip. Wings with the first quill very minute and spurious: the three next subequal and longest. Legs and feet as in *Zosterops*, strong: tarse to sole just plus the middle toe and nail. Toes short, depressed, unequal; the fores much basally connected; the hind smallest, with or without the nails: nails very falcate, stout, equal.

"*P. melanozantha*, mihi. Length five inches; bill seven-sixteenths; tail one and three-quarters; wing under three inches; tarse nine-sixteenths; central toe and nail the same; hind three-eighths of an inch. Blue-black, paler below, and a broad white stripe passing from chin to breast, whence to the vent inclusive is rich yellow. Alars and caudals dusky. The extreme caudals with a large white spot near the tips inside. Bill dusky-blue, with fleshy base. Legs plumbeous. Female duller-hued, and more or less shaded with olive.

"These birds are peculiar to the hills. They are shy, and make ingenious pendulous nests, like the *Myzanthé*. Their food consists of small insects and viscid berries, which latter they swallow entire. The upper mandible is (typically) denticulated."

As many as six generic forms certainly require to be distinguished in this *Dicæum* group, which are as follow:—1, *Myzomela*, exemplified by *M. sanguinolenta* and other Australian species; 2, *Dicæum*, as *D.*

\* Unfortunately, this name too closely resembles *Myzantha*, of the *Meliphagidæ*.

*cruentatum*, *D. concolor*, *D. chrysochlorum*, &c. ; 3, *Myzanthe*, Hodg., *ante*, as *M. hirundinacea* of Australia, and *M. ignipectus* of the Himalaya ; 4, *Pachyglossa*, Hodg., *ante*, *P. melanozantha* ; 5, *Piprisoma* (XIII, 314), *P. agilis* ; and 6, *Prionochilus*, *ante*. The three first differ chiefly in the degree of elongation of the bill,\* and the two last are also allied together ; and they combine to form a natural and satisfactory group.

Of the remarkable form noticed as *Myzornis pyrrhoura* in XII, 984, I find also the following description by Mr. Hodgson :

*Myzornis*, H. "General structure of *Yuhina* (*As. Res.* XIX, 165), but slighter. Bill moderately slender, more or less cylindric, and arcuate with both tips down ; the upper conspicuously longer, and furnished with one sharp tooth : nares lineo-lunate, typically large and soft : wings, tail, and feet as in *Yuhina* ; but the feet stronger, and the wings and tail more feeble. Tongue brushed. Hab. Northern and central hills [of Nepal.]

"*M. pyrrhoura*, mihi. Bright parrot-green, more or less merged in rusty on the throat and vent. Outer margins of caudals, and of mid-alars, fiery-red, or carmine : wings tipped with white. Lores black, and black streaks on the crown. Legs fleshy : bill black. Length five inches and a half ; bill eleven-sixteenths ; tail one and five-eighths ; wing two and seven-sixteenths ; tarse fifteen-sixteenths ; central toe and nail five-eighths ; hind nine-sixteenths. *Remark*.—These birds have the manners and general structure of *Yuhina* : but they want the Bulboul-like crest common to all the species of that type : their more slender bill is unidentate only, and their tarse is longer, being a third plus the middle toe and nail ; it is also stout, and quite smooth. We may here add, that our *Sibia* is another truly meliphagous form, proper to these hills."

*Yuhina*, Hodgson, since termed by him *Polyodon*, is re-defined as follows, and a third species described ; the *flavicollis*, passim, being removed, and regarded as a distinct type, *Ixulus*.

"Bill moderate, much depressed as far as the large nares, compressed beyond. Tip of the upper mandible inclined, with three [minute] teeth on each side : gape bristled, reaching to the eyes : brows soft. Nares large, fossed, membranous ; the aperture lunated

\* This elongation of the bill is, I suspect, merely further carried out in *Drepanis*, Tem., v. *Melithreptus* (in part), Vieillot.

by the nude soft membrane. Tongue as long as the bill, moderately extensile, cleft nearly to the base, and the prongs convolved and filamentous, forming a full brush: wings medial, the fifth quill longest. Tail nearly even and divaricate. Alars and caudals wedged and mucronate. Legs and feet strong and rept. Types, *gularis*, *occipitalis*, and *nigrimenta*: the two former published; the last new.

“*Y. nigrimenta*, H. Above olive-brown; below rufescent-yellow; cheeks and throat white; tip of chin, and lores, black: crest slaty-blue, legs fleshy. Bill dusky above, ruddy-fleshy below. Length four inches and a half; bill five-eighths of an inch; wing two inches and one-eighth; tail one and five-eighths; tarse three-quarters of an inch; central toe and nail half an inch; hind seven-sixteenths. [*Non vidi.*]

“These birds are genuine *Meliphagidæ*, with the brushed tongue of the type of that group. They feed on tiny insects that harbour in the cups of large deep flowers, such as the *Rhododendrons*, and to which the birds cling with their strong feet. They also take berries occasionally. They are exclusively monticolous, like our *Saroglossa* (*J. A. S. XIII*, 367), another *Meliphague* in the guise of a *Stare*, and therefore probably related to the *Etourneau verdâtre*.\*

“*Ixulus*, H. Bill short, as in *Brachypus* [*Pycnonotus*?], but less stout, and the nares larger and more membranous. Tongue simple. Head crested. Wings rather short, more or less acuminate, the first three quills gradated, and the three next subequal, the fifth being usually longest. Tail moderate, subfurcate. Legs and feet suited for clinging. Tarse elevate, stout, considerably plus the mid-toe and nail. —Anteal toes short, unequal, depressed, and considerably connected at their bases. Hind large, broad, equal to inner fore without the nails, and to the outer with them. Nails *Parian*.

“Type *I. flavicollis*,” olim *Yuhina flavicollis*, *As. Res. XIX*, 167. The near general approximation of my *Siva occipitalis* to this species has already been noted (p. 552), although the beaks of the two birds are very different.

The Indian *Zosterops*, (*XII*, 985,) it now appears, has been designated *maderaspatanus* by mistake. “There is properly,” writes Mr. Strickland, “no such specific name as *maderaspatanus* for a

\* I differ from Mr. Hodgson respecting the affinities of the *Saroglossa*, which I consider to be decidedly a *Sturnidous* bird, with meliphagous adaptations.—*Cur. As. Soc.*

*Zosterops*. Linnæus only wrote it in his *Syst. Nat.* by a slip of the pen for *madagascariensis*, as the bird he called *Motacilla maderaspatana* was from Madagascar, and Gmelin properly corrected the name to *madagascariensis*." The Indian species is the *Sylvia annulosa*, Var. *A*, of Swainson's Illustrations, and will now rank as *Z. annulosus*, (Sw.) It seems peculiar to the hilly parts of the country, from the Himalaya to Ceylon.

A second described oriental *Zosterops*, inhabiting Java and the Philippines, and probably the Malay countries generally, is the *Dicaeum flavum* of Horsfield, *Lin. Tr.* XIII, 170. Dr. Horsfield informs me, that "it is nearly allied to the Indian species, but distinct."

*Z. nicobaricus*, nobis, is a third common in the Nicobar islands. Length four inches, by six in extent of wings; closed wing two inches; tail one and a half; tarse five-eighths of an inch; bill to gape nine-sixteenths. Nostrils covered as usual by a soft impending scale; and the tongue subdivided at tip into a pencil of thin filaments. Upper parts greyish olive-green, greenest on the forehead, wings, and upper tail-coverts: throat and front of neck pale yellowish, the breast and under-parts whitish, except the lower tail-coverts which are light yellow: eyes surrounded, as usual, by silky white feathers; the lores and beneath the white orbital feathers blackish, the former surmounted by a yellowish line. Bill dusky, the base of the lower mandible pale; and the legs albescent-plumbeous. Upon dissection, the muscular coat of the stomach of a bird of this species was found to be considerably more developed than in *Nectarinia*, and both stomach and intestines contained numerous hard black seeds, about the size of No. 8 shot: these had probably been contained in a pulpy berry; and the fact of their passing the intestines is worthy of notice, as a Thrush fed upon haws invariably ejects the stones by the mouth.

There are two or more species of this genus in the Isle of France: viz.

*Z. curvirostris*, nobis. A good deal allied to the last in plumage, but having a more slender and distinctly incurved bill, rather longer than usual in the species of *Zosterops*; the tongue subdivided at tip into numerous filaments, forming a tolerably large brush. Length about four inches, of wing two inches, and tail one and a quarter; bill to gape five-eighths, and tarse three-quarters of an inch. Orbital feathers conspicuously white as usual. Head and fore-part of the neck dull ashy, tinged slightly with green; the rump, wings, and tail,

brightish olive-green: under-parts ashy, more or less pure, and passing to rufescent-whitish on the belly; the lower tail-coverts bright yellow; and the throat whitish, slightly tinged with yellow in one of two specimens: bill dusky, the basal two-thirds of the lower mandible yellowish; and the legs pale.

The true *Z. madagascariensis* also inhabits the Mauritius: but this, as Mr. Strickland informs me, is a short-beaked species, and therefore cannot be the same as the foregoing; besides that the description of it does not sufficiently apply to *Z. curvirostris*.

*Z. (?) borbonicus*, (Brisson). This is nearly allied to *Zosterops*, but is without the white orbital feathers so characteristic of that genus; it has also much the look of the British *Curruca sylvia* (upon a superficial view), but has no particular affinity for the latter.\* It is probable that some more immediate congeners of this bird inhabit Australia, where not only the genus *Zosterops* attains its chief development of species, but also more especially the great austral group *Meliphagidæ*, to which *Zosterops* strictly belongs. The present species is also from the Isle of France.

Genus *Phyllornis*, Boie, v. (subsequently) *Chloropsis*, Jardine and Selby. The gradual enrichment of the Society's museum enables me now to offer a more satisfactory synopsis of this genus than that attempted in XII, 955 *et seq.*

A. With thicker bills, the upper mandible abruptly bent over (more or less so, in different specimens,) and sometimes quite hooked at tip. The shoulder of the wing uniformly green with the rest. Peculiar to the Malay countries.

1. *Ph. Sonneratii*, (Jardine and Selby): *Ph. Mullerii*, Tem.; female, *Turdus viridis et Chloropsis zosterops* of Horsfield: young male, *Chl. gampsorhynchus*, Jardine and Selby.

2. *Ph. cyanopogon*, Tem.: female, (or perhaps young male,) *Chlo-*

\* By the way, I may here notice that the *Curruca sylvia* (v. *garrula*), so called, of S. India, is conspicuously a larger bird than its European relative, having the wing fully two inches and three-quarters long, and the rest in proportion: the general tone of colour is also somewhat darker, and the bill and legs are proportionally larger and stronger, the tarse measuring from thirteen-sixteenths to seven-eighths of an inch. As for the roseate tinge on the under-parts mentioned by Sykes, this is common to fine specimens from either country. I certainly consider the Indian bird to be distinct, and shall therefore name it *C. affinis*.

Prof. Behn also informs me, that the species assigned to *C. orphea* by Mr. Jerdon, is not the true *C. orphea* of continental Europe.



*ropsis mysticalis*, Swainson (*Menag.* p. 296), and described as that of the next species (which was erroneously referred to *malabaricus*,) in *J. A. S.* XII, 957. Exactly resembles the preceding except in its much smaller size, the male having rather less black on the throat, but a larger and broader azure moustache : the female has the throat and under-parts yellowish, with the blue moustache less developed. Length six inches to six and a half, of wing two and seven-eighths to three and a quarter, and tail two and a half to two and five-eighths ; bill to gape thirteen-sixteenths of an inch, and tarse five-eighths.

*B.* The bill tapering to its extremity, and slightly curved. The shoulder of the wing of an ultramarine colour, more or less extended. Hab., for the most part, India, Burmah, and probably China.

3. *Ph. cochinchinensis*, (Lath., Gm.), the adult male, and *malabaricus* apud Latham, the young male ; *Chl. cochinchinensis*, Jardine's synopsis : *Verdin de la cochinchine*, Buffon ; *Chl. malabaricus* apud nos, *J. A. S.* XII, 957 (nec fœm.), and probably of Eyton, *P. Z. S.* 1839, p. 102 ; probably also *Meliphaga javensis*, Horsfield. This is the only species of the present subdivision which I have seen from the Malay countries ; and specimens from the vicinity of the Straits present a considerable approximation in the form of bill to the members of the preceding section, while those from Arracan have decidedly a more tapering bill, less abruptly curved at the tip, and approaching therefore to the Indian type of *Phyllornis*. If I am right in identifying the *Chl. malabaricus* apud Eyton with the present species (of which I have little doubt), that author states that " the female differs from the male in having the markings less distinct : " this is probably the case with the mature female ; but what I suspect is a young female from Singapore has the forehead, throat, and region of the eyes, green, and a fulvous tinge on the crown only, not any below ; and a presumed young male from Arracan has a strong fulvous tinge on the crown, neck, and breast, while the throat is greenish, with distinct verditer moustache, more developed than that of the female *cyanopogon*. In any state of plumage, the latter species may be readily distinguished from this other small one, by the total absence of blue on its wings and tail.

The three foregoing species are all common in the vicinity of the Straits of Malacca, and I doubt if any of the following occur in the Malay countries. The two next are proper to the peninsula of India, No. 4 only extending to the hill regions of Bengal.

4. *Ph. Jerdoni*, nobis : *Chl. cochinchinensis* apud Jerdon, *Catal.* : the male described as the female of the next, in *J. A. S.* XII, 956.

5. *Ph. malabaricus*, (Gm.); *le petit Merle de la côte de Malabar*, Sonnerat : *Chl. cæsmarhynchos*,\* Tickell; *Chl. aurifrons* apud Jerdon, *Catal.*

And the two remaining species inhabit Nepal, Assam, Sylhet, and Arracan; No. 6 extending into Bengal.

6. *Ph. aurifrons*, (J. and S.); figured as *Chloropsis malabaricus* by Messrs. Jardine and Selby, as subsequently corrected by them in their synopsis of the genus.

7. *Ph. Hardwickii*, (J. and S.): *Chl. curvirostris*, Swainson; *Chl. cyanopterus*, Hodgson; *Chl. chrysogaster*, M'Clelland and Horsfield; and *Chl. auriventris*, Guérin.

I shall now essay to enumerate the Indian and Malayan Bulbous, which are very numerous, and pertain to various genera.

To commence with the genus *Pycnonotus* of Kuhl, comprising *Hæmatornis* of Swainson, nec Vigors.

1. *P. bengalensis*, nobis : *P. v. Ixos cafer*, apud nos et alios, ante.† Bengal, Nepal, Assam, Sylhet, Tipperah.

2. *P. hæmorrhous*, (Lath.): *Hæmatornis pusillus et pseudocafer*, nobis, *J. A. S.*, X, 841, &c.; *cafer* apud Jerdon, *Catal.* Peninsula of India, and Arracan: common about Agra.

3. *P. jocosus*, (L.): *Gracula cristata*, Scopoli; *Lanius emeria*, Shaw.

\* This unmeaning name, *cæsmarhynchos* (apud Tickell), *v. casmarhynchos* (apud Gray), is merely a misprint for *gampsorhynchus* of Jardine and Selby: vide Griffith's 'Animal Kingdom,' VI, 391.

† In a letter lately received from Lord Arthur Hay, his lordship says—"I have been inspecting Buffon's figure of the true *cafer* from the Cape, and it does not agree in the least with the Bengal bird." Mr. Strickland, judging from the admeasurements alone (in the *An. and Mag. N. H.*, Vol. XIV, 47), concluded them to be the same. The wide difference of habitat, however, would lead to a pre-supposition of their distinctness; and presuming that they do differ, I now propose for the common Bengal species, the specific name *bengalensis*. This name is, indeed, better applicable than such terms usually are, since it is very doubtful whether more than two species of the genus exist in Bengal, this and the *jocosus*, and the present one is by far the more abundant of the two. It is closely allied to *P. hæmorrhous*, from which it differs in its larger size, and the greater extent of the black colouring, which spreads over the whole neck (excepting the ear-coverts, which are brownish), and low upon the breast, the back and belly also being much darker than in *P. hæmorrhous*, but the feathers of these parts are similarly margined with greyish. Length nine inches and a half, by twelve and a half in spread of wing; the closed wing four inches, and tail the same.

India generally, extending eastward to Tipperah and Arracan, and thence southward to Penang and even Malacca.\*

4. *P. monticolus*, (M'Clelland and Horsfield), *Proc. Zool. Soc.* 1839, p. 160. Said to differ from the last by having "a scarlet ring about the eye, but no tuft beneath this organ." Kossia mountains, Assam. It rather requires verification.

5. *P. crocorrhous*, Strickland, *An. and Mag. N. H.* 1844, p. 412: *Muscicapa hæmorrhousa*, Var. B., Gm.; *Turdus hæmorrhous*, apud Horsfield. Java.

6. *P. bimaculatus*, (Horsf.), *Lin. Tr.* XIII, 147. Java.

7. *P. goiavier*, (Scopoli): *Muscicapa psidii*, Gm.; *Turdus analis*, Horsfield. Malay countries generally.

8. *P. leucotis*, (Gould), *Proc. Zool. Soc.* 1836, p. 6. Common in Scinde, and I am informed also in Guzerat. It is likewise enumerated in a list of birds "collected in the north-western provinces of the Bengal presidency, in north latitude 29° to 31°, and east longitude 77° to 88°", and consisting chiefly of inhabitants of the plains, but with a few from the Himalaya, in *P. Z. S.* 1842, p. 92.†

9. *P. leucogenys*, (Gray), Hardwicke's *Ill. Ind. Zool.* Common in the Himalaya, and in Kashmir.

10. *P. flavirictus*, Strickland, *An. and Mag. N. H.* 1844, p. 413: *Tricophorus virescens*, Tem., apud Jerdon. Southern India.

11. *P. plumosus*, nobis. Length about seven inches, of wing three and a quarter, and tail three inches; bill to gape three-quarters of an inch; and tarse the same. This bird is remarkable for the extraordinary density and copiousness of its rump plumage, which has suggested the name bestowed on it. Colour of the upper parts darkish olive-brown, shaded with dull green, the wings and tail margined with brighter green; coronal feathers rounded and scale-like, of a cinerascens hue, slightly margined laterally with greenish: under-parts pale brown, lightest on the throat, and the lower tail-coverts slightly ochreous. Bill

\* I have not actually compared Malayan with Bengal specimens, but have an impression that the crimson ocular tuft is considerably less developed in the former.

† In this list are several names, which, I suspect, require to be corrected: viz. "*Hirundo riparia*?" probably *H. sinensis*; "*Oriolus galbula*," probably *O. kundoo*; "*Malacocercus striatus*," probably *M. terricolor*; "*Ianthocinclia leucocephala*," doubtless *Garrulax leucolophos*; "*Megalurus palustris*, Sykes," probably *Pellornium ruficeps*, which is *Megalurus ruficeps*, Sykes; and "*Centropus sirkee*," probably *Taccocua infusca*, nobis.

dusky, and feet appear to have been reddish-brown. Two specimens are perhaps distinct, though very closely allied. In these the greenish tinge is wanting, even on the wings and tail, and there is no ashy tinge on the head, the feathers of which are much less scale-like; the lower tail-coverts also have a less decided tinge of ochreous, and the throat is much less albescent. In other respects they are similar. These are from Malacca, and the former from Singapore. Should they prove distinct, the second may bear the specific name of *brunneus*.\* One or both are probably alluded to as one of two varieties of *P. goiavier*, (v. *Turdus analis*, Horsf.,) mentioned by Sir Stamford Raffles.

12. *P. flavescens*, nobis. So like the next in its general characters and colouring, that it might be supposed to be the female of that species, differing from the male in wanting the yellow spots on the throat, and the yellowish colour on the crown, were it not that the tail is always considerably more graduated, its outermost feathers measuring three-quarters of an inch shorter than the middle ones; whereas in *P. Finlaysoni* the difference is but half as much: it would, besides, be contrary to the analogy of all its congeners, for the sexes to present so marked a difference. Length about seven inches and three-quarters, of wing three and a quarter, and tail four inches; bill to gape seven-eighths of an inch, and tarse three-quarters of an inch. Colour dull greenish-olive above, the crown darker, with broader and more rounded coronal feathers than in *P. Finlaysoni*; alars margined with brighter yellowish-green, and caudals less decidedly: under-parts paler, mingled with dull yellow, imparting a streaky appearance; the vent and lower tail-coverts bright yellow, paling on the belly: lores blackish, surmounted with yellowish-white. Bill and feet dark. Hab. Arracan, where much less common than the next species.

13. *P. Finlaysoni*, Strickland, *An. and Mag. N. H.*, 1844, p. 411. Common in Arracan.

14. *P. zantholaimus*, Jerdon, *MS.* Length seven inches and a quarter and upwards, of wing three inches to three and a half, and tail three and a quarter to three and a half; bill to gape three-quarters of an inch to thirteen-sixteenths, and tarse three-quarters to seven-eighths. Upper parts ashy, tinged with green on the wings and tail, the crown yellowish-green, and throat and fore-neck pale yellow;

\* Since the above was printed, I have received from Lord Arthur Hay a specimen of this *brunneus*, labelled by his lordship *Brachypus modestus*, A. Hay.

lower parts of a lighter ash-colour than the back, the tibial feathers and under tail-coverts pale yellow, and all but the middle tail-feathers tipped with yellowish-white, increasing in quantity to the outermost : bill and feet dark. Hab. Southern India.

15. *P. melanocephalus*, (Gray), Hardwicke's *Ill. Ind. Zool.* : *Brachypus plumifer*, Gould, *Proc. Zool. Soc.*, 1837, p. 137 ; *Vanga flaviventris*, Tickell, *J. A. S.* II, 573. Himalaya, Assam, Sylhet, Tipperah, and Arracan ; also Central India.

All the above are in the Society's museum, with the exceptions of *P. crocorrhous*, *P. bimaculatus*, and the somewhat dubious *P. monticolus*. Also a common Chinese species, the *P. sinensis*, (Lath.), founded on *le Gobe-mouche verdâtre de la Chine* of Sonnerat, and figured as *Turdus occipitalis*, Tem., by MM. Eydoux and Gervais, in the 'Voyage de la Favorite'. Dr. Cantor procured this bird in Chusan, and the Society's specimens are from Macao. That figured by the French naturalists cited was obtained at Manilla. In general, however, the ear-coverts have a central whitish spot, instead of being wholly blackish, as represented in the coloured figure adverted to. Another common Chinese species, which is in the collection of Lord Arthur Hay, is *le Gobe-mouche à tête noire de la Chine* of Sonnerat, v. *P. atricapillus*, (Vieillot).\*

The following Malayan species are, I presume, to be added to those already noticed.

*Ixos virescens*, Tem. (p. c. 382, fig. 1), which would seem to be allied to *P. plumosus*.

*I. chalcocephalus*, Tem. (p. c. 453, fig. I).

*Lanius xanthogaster*, Raffles, *Lin. Tr.* XIII, 309. This, however, is more doubtful as a true *Pycnonotus*.

Also two species from Southern India (in the Mysore district, bordering the Neilgherries), which Mr. Jerdon procured, but unfortunately

\* Since writing the above, *P. atricapillus* has been received on loan from Lord A. Hay. Its place in the series is between *P. jocosus* and *P. leucotis*, but with the crimson lower tail-coverts of the first, though more brilliant. Length nearly nine inches, of wing three and three-quarters, and tail four inches ; bill to gape seven-eighths, and tarse the same. Colour of the upper-parts light brown, with greyish edgings to the feathers, the upper tail-coverts and the entire under-parts brownish-albescent ; cap glossy black, the feathers not much elongated ; chin, lores, and beneath the eyes, also black ; wings deep brown, the feathers margined paler ; and tail dusky-black, gradually deeper on the terminal half, the caudal feathers being all tipped with white : bill black, and legs dusky-black.

lost the specimens before he took a description of them. Coloured drawings of them, however, were taken by a native painter in Mr. Elliot's service, and from these Mr. Jerdon drew up the following notices. Vide 'Madras Journal', No. XXX, p. 168. They were about six and a half or seven inches in length, the second being rather the smaller.

"*Yellow-eared Bulboul*. Above yellowish-green, beneath yellow; ocular region black; a plume of soft loose feathers over the ear tipped with yellow. •

"*White-eared Bulboul*. Above light green, beneath greenish-yellow; head, neck, and breast, dusky grey; ear-spot white."

Lastly, as a very aberrant species, I shall provisionally refer to this genus the bird considered by Mr. Jerdon to be the *Turdus indicus*, Gm., and ranged by him in the same division with *Pycnonotus flavirictus*; but which Mr. Strickland thinks is considerably too small for Gmelin's *indicus*, and has therefore given it a new name, describing it as *Criniger ? ictericus*, *An. and Mag. Nat. Hist.*, 1844, p. 411. The only specimen in the Society's collection, and which was presented by Mr. Jerdon, accords in its dimensions with those given by Mr. Strickland; but Mr. Jerdon gives the length as from seven and a half to eight inches, wing four inches, and tail three and a half, which last admeasurement only, holds true in the Society's specimen: and if the species ever attains those dimensions, I think there can be no objection to identifying it as the *indicus* of Gmelin.\*

*Alcurus striatus*, (Blyth) Hodgson, *J. A. S. XI*, 184. This differs little from *Pycnonotus* in form of bill, but its large size and thick heavy body ally it to *Criniger* (v. *Tricophorus*), in which genus I originally placed it, while Mr. Hodgson first assigned it to *Pycnonotus*. It does not, however, range well with any other species known to me, and at my recommendation Mr. Hodgson applied the name *Alcurus* to it, which I here adopt.

Genus *Criniger* (subsequently *Tricophorus*), Temminck.

1. *Cr. ochrocephalus*, (Gmelin): *Tricophorus crispiceps*, nobis, *J. A. S. XI*, 204. Malay countries generally, and the Tenasserim provinces. It is a favorite cage bird with the Malays.

\* It is remarkable that a common African Bulboul (*Pycn. chrysorrhæus*) has recently turned up in Ireland. Vide *An. and Mag. N. H.* 1845, p. 308: the whole group of Bulbouls being, otherwise, extra-European, and there is nothing approaching to the form in all America. Neither do I remember a single Bulboul genus in Australia.

2. *Cr. flaveolus*, (Gould), *Proc. Zool. Soc.* 1836, p. 6. Common in the Himalaya, and in the hill ranges of Assam, Sylhet, and Arracan. An allied South African species is figured by Dr. Andrew Smith, as *Tricophorus flaviventris*.

3. *Cr. Tickelli*, nobis: doubtfully referred to *Ixos virescens*, Tem., by Capt. Tickell, *J. A. S.* II, 573, but evidently a distinct species of the present genus, allied to the preceding one. From near Midnapore. (*Non vidi.*)

4. *Cr. gularis*, (Horsfield), *Lin. Trans.* XIII, 150. Allied in plumage to *Cr. flaveolus*, but crestless, and the beak remarkable for its Vanga-like, or *Lophocitta*-like, form, with the tip of the upper mandible abruptly bent over. Malay countries generally.

*N. B.* I may here remark, that the genera *Lophocitta*, *Vanga*, and *Prionops*, form together a peculiar group of Bulbous, of which the only known oriental species is *Lophocitta galericulata*, (Cuv.), common near the Straits of Malacca: but the *Lanius coronatus*, Raffles, *Lin. Tr.* XIII, 306, would seem to be nearly allied.\* The habits of *Prionops talacoma*, as described by Dr. A. Smith, are quite those of the ordinary Bulbous.

*Spizixos*, nobis, *n. g.* General structure of *Pycnonotus*, but differing greatly in the shortness and (for a member of this group) extraordinary thickness of the bill, the lateral outline of which approaches that of *Conostoma æmodius*, Hodgson, *J. A. S.*, X, 856, except that the tip of the upper mandible curves more decidedly downward over that of the lower mandible, being also pointed and distinctly notched, with a situation corresponding to the notch in the lower mandible: as viewed from above, however, the resemblance to the beak of the *Conostoma* ceases, for that of the present bird narrows evenly to a point from a tolerably wide base: the ridge of the upper mandible is obtusely angulated, and it is distinctly arched, rising at base where concealed by the feathers of the forehead. Rest as in *Pycnonotus*, but approaching to *Criniger*.

*Sp. canifrons*, nobis. Length about eight inches, of wing probably

\* Mr. G. R. Gray, I observe, gives, as synonyms of *Lophocitta galericulata*, the *Lanius scapulatus*, Licht., *L. coronatus*, Raffles, and *Vanga cristata*, Geoff., figured in Griffith's 'Animal Kingdom'; but the figure adverted to has a much flatter bill, which is coloured white, and the primaries are coloured rufous. Mr. G. R. Gray refers *Lophocitta* to the Jay group, in which I cannot agree with him.—The Society has now received *Lanius coronatus*, Raffles, which is obviously the female of *Loph. galericulata*.

three and three-quarters (but the first primaries were growing in the specimen), and of tail three and a half: bill to forehead a little exceeding half an inch, and to gape three-quarters; tarse also three-quarters of an inch. General colour bright olive-green, becoming yellowish-green and more vivid on the rump and margins of the primaries, and inclining also to yellow on the belly and more decidedly on the lower tail-coverts: forehead and chin pale ashy; the nape, with the sides and front of the neck, somewhat darker, passing into blackish on the throat; and the crown black, its feathers lengthened to form a crest nearly an inch high: tail-feathers largely tipped with blackish. Bill yellow; and legs brown. Hab. Cherra Poonjee, or the hill ranges bordering on Sylhet to the northward.

*Hemixos*, Hodgson, *n. g.* "Bill to gape rather longer than the head, [moderately slender,] inclining to arch, with terminal notch, and erect, entire, trenchant *tomixæ*. Tongue cartilaginous, and simply bifid. Rictus bristled. Nares lunate, lateral, shaded above by a small unarched nude membrane, which is set over by small nareal bristles. Legs and feet very short, but stout: the tarse strong and smooth. Toes short, very unequal, depressed; the fores basally connected, the outer one as far as the joint, the inner less so. Nails strong, acute, and highly curved. Wings medial, round, acuminate; the fifth quill longest: the first two much, and the two next slightly, gradated. Tail ample, very firm, even, but inclining to furcation.

"*H. flava*la, mihi. Length eight inches and a third; expanse twelve inches; closed wing four inches; tail three and a half; bill to gape an inch; tarse (to sole) thirteen-sixteenths; central toe nine-sixteenths; outer seven-sixteenths; inner three-eighths; hind five-sixteenths. Weight 1 oz." General colour ashy, with dusky wings and tail, the former having the secondaries and tertiaries, with their great range of coverts, broadly margined with bright greenish-yellow, and the tail a little tinged with the same externally: throat and lower tail-coverts white; the belly greyish-white, and the breast of a paler ash-colour than the back: lores and streak from base of lower mandible black; the ear-coverts brown, and crown dusky-greyish, the coronal feathers lengthened and pointed, as in *Hypsipetes*. Bill black, and legs plumbeous.

"This type," remarks Mr. Hodgson, "is compounded of the characters of *Hypsipetes* and of those of the Bulbous, between which it claims a place. Its manners, like its form, are intermediate. It feeds mostly



on pulpy berries, but likewise takes soft and imperfect insects. It does not sing, nor is caged; and it seems to be wholly confined to the hills, being unknown below. The sexes are alike in colouring, but the male is rather the larger bird. The stomach is muscular, and of considerably unequal thickness in its outer coat; the inner being tough and striate. Intestinal canal eight inches and a half, the cœca very small and rudimentary. Contents of stomach commonly berries, rarely soft and imperfect insects, and also some perfect and hard ones chiefly in winter.” (Hodgson’s *MSS.*) It appears to be very common along the sub-Himalayan ranges, extending to those of Assam, Sylhet, and Arracan.

*Iole*, nobis, *J. A. S.* XIII, 386. This distinct form, I am now satisfied, falls under the *Bulboul* group, being allied to the preceding, and to *Hypsipetes*. The coronal feathers are pointed, as in both; and the beak is that of *Hypsipetes*, shortened and widened, and thus deviating in the Flycatcher direction; the whole form being also shortened, or as in an ordinary *Bulboul*.\*

*I. olivacea*, nobis, *J. A. S.* XIII, 386. Common at Malacca. Fine specimens attain a length of seven inches and a half, wing three and a half, and tail three and a quarter.

*I. virescens*, nobis. Length about six inches and a half, of wing three inches, and tail the same; bill to gape seven-eighths of an inch, and tarse eleven-sixteenths. Colour olive-green above, paler and more yellowish below, the throat inclining to albescent, and the lower tail-coverts tinged with ochreous, as is also the tail: a slight shade of the same prevails upon the crown, back, and wings. Bill dusky above, pale below; and feet light brown. Younger specimens have the throat more yellowish, and the coronal feathers are less pointed and distinct. Common in Arracan.

*I. cinerea*, A. Hay. For the loan of an example of this fine species I am indebted to Lord Arthur Hay. It has the *Hypsipetes* character of the coronal feathers more developed than in either of the others. Length about seven inches, of wing three and three-quarters, and tail three and a quarter; bill to gape seven-eighths, and tarse three-quarters of an inch. Upper parts cinereous-brown, the forehead and

\* This species will have been named by M. Temminck, as also my *Tephrodornis grisola*, *J. A. S.* XII, 180, *Phœnicura leucoptera*, XII, 962, and *Muscicapula melanoleuca*, (Hodg.), XII, 940; as all of these have now been received by the Society from Java.

above the eye ashy, which also margins the pointed feathers of the crown; throat, middle of belly, and lower tail-coverts, white, the flanks and across the breast pale ash-brown. Bill and feet dusky, the latter having apparently been brown. From Malacca.

*Hypsipetes*, Vigors. The species of this genus exhibit a considerable gradation: the first two being typical, with sub-furcate tail, a character which is less marked in the second. These have also coral-red bills, ashy plumage, and black crown.

1. *H. psaroides*, Vigors. Common in the Himalaya, extending to the hill ranges of Assam, Sylhet, and Arracan.

2. *H. neilgherriensis*, Jerdon. Neilgherries and Ceylon.

3. *H. ganeesa*, Sykes: figured in the 2nd series of the 'Illustrations of Ornithology', by Sir W. Jardine and Mr. Selby. This species I have never seen. It is proper to Western India, and is probably common in the Mahabuleishwa hills.

4. *H. McClellandii*, Horsfield. Bill dusky, paler below: wings and tail green, the latter nearly square, but having its two or three outermost feathers successively a trifle shorter. This species takes the same range as *H. psaroides*.

From the above, we pass to more aberrant species, with the bill stronger, and the tail shorter and more rounded.

5. *H. philippensis*, Strickland, *An. and Mag. N. H.* 1844, p. 413.

6. *H. malaccensis*, nobis. This approaches nearly to the description of the last, but has the crown of the same olive-green with the back, and no trace of rust-colour on the cheeks and chin. Length about eight inches and a half, of wing four inches, and tail three and a half, its outermost feathers a quarter of an inch less: bill to gape an inch and one-eighth; and tarse three-quarters of an inch. Upper parts dull olive-green, the wings and tail brownish-dusky, margined with the colour of the back: throat and breast ashy, with whitish centres to the feathers, the abdomen and lower tail-coverts dull white: bend of the wing underneath, and the axillaries, pale yellow. Bill and feet horn-coloured. Feathers of the crown pointed, but this character is less developed than in the more typical species. In two specimens, some old unshed secondaries and wing-coverts have a rufescent tinge, but there is no trace of this in old birds. The rictal bristles are considerably more developed than in the typical species, (as in *Hemixos* and *Iole*,) while in *H. McClellandii* they are intermediate. Common at Malacca.

A specimen from the Nicobars is perhaps the young, having the wing but three inches and a half long, and the secondaries, tertiaries, and edges of the primaries, rufous-brown; tail slightly tinged with the same: coronal feathers tinged with dusky-ash, and less pointed; the throat and fore-neck white, tinged with yellow; and the rest of the under-parts mixed yellow and white, with olive on the sides of the breast: bill also shorter, tinged with yellow, and approaching in form to that of the next group, as indeed does the whole figure of the bird; so much so, that if the above characters prove to be permanent, I would propose for it the name *Ixocincla virescens*.

A form requiring, I think, distinction from *Hypsipetes*, may be designated

*Ixocincla*, nobis. It differs from *Hypsipetes*, in its more bulky form, stouter and more meruline bill, and in the greater size of the legs and toes; but in other respects is nearly allied.

\* *I. olivacea*, (Jardine and Selby); the female erroneously figured as *Hypsipetes ganeesa*, in the *Ill. Orn.*, 1st series, pl. CLXVIII, and (as I am informed) subsequently named *Hyps. olivacea* in the second series of the same work, where a figure of the true *H. ganeesa* is given. This bird has a much more meruline aspect than in true *Hypsipetes*, and it is known as the *Merle* to the colonists of the Isle of France. Length eleven inches and a half, of wing five and three-eighths, and tail four and five-eighths; bill to gape an inch and three-eighths, and tarse an inch. Male having the upper-parts dusky, the feathers margined with dark dingy greenish; wings and tail uniform dusky-brown, the tertiaries slightly margined with ashy: cap blackish, the feathers pointed as in true *Hypsipetes*; lores deeper black, and a slight grey supercilium from the nostrils to the occiput, lighter-coloured from the nostrils to the eye: under-parts uniform dusky ash-colour, purer on the throat, and paling on the belly and under tail-coverts, which last have a faint tinge of ferruginous: bill bright orange-yellow; and the legs appear to have been yellowish-brown. Female paler, with the greenish margins to the feathers much more developed, and the ash-colour confined to the throat, ear-coverts, and front of the neck.

*Turdus borbornicus*, Lath., is perhaps a second species of this type.

The generic name *Brachypus*, it seems, must now be abandoned, at least in Ornithology, and it appears never to have been employed in a very definite signification. At all events, very different forms of

\* *Turdus aticilia*, Cuv. *A. de Indes*. *Pl.* 348<sup>1</sup>

Bulbous have been brought together under this appellation. Swainson gives *Turdus dispar*, Horsf., as the type; and Gray and Gould have applied it to species of true *Pycnonotus*; viz. *Br. leucogenys* and *Br. melanocephalus*, Gray, in Hardwicke's 'Illustrations,' and *Br. plumifer*, Gould, a synonyme of the second species cited: *P. leucotis*, however, is referred by Gould to *Ixos*; and his *Br. gularis* would seem to be a true congener of *Br. dispar*, (Horsf.,) Sw. To the type of the two latter species, I shall now provisionally give the name *Rubigula*; and then there remains that of *Lanius melanocephalus*, Gm., and its congeners, for which I can find no appellation, and shall therefore designate *Brachypodius*.

*Rubigula*, nobis. There is unfortunately no specimen in the museum from which I can define this group, but of the present series it makes the nearest approach to *Pycnonotus*, and has the rump uniformly coloured with the back, and a subquadrate tail, unlike the next form. The species (at least in the male sex) are remarkable for the brilliant ruby, or sometimes orange-ruby, hue of the throat, the feathers of which are rigid and glistening. Three species would appear to have been ascertained.

1. *R. dispar*, (Horsfield), *Lin. Tr.* XIII, 150. Malay countries.

2. *R. gularis*, (Gould), *Proc. Zool. Soc.* 1835, p. 186: *Brachypus rubineus*, Jerdon. Southern India.

3. *R. ———*, <sup>*cinerea, Temminck, Var. Pulch. Ind. Pal. S. A.*</sup> (Temminck), p. c. 382, fig. 2, as noticed in Griffith's 'Animal Kingdom,' VI, 390. Java.

*Brachypodius*, nobis.

1. *Br. entilotus*, (Jardine and Selby), *Ill. Orn.*, 2nd series. (*Non vidi.*) Hab. Malacca.

2. *Br. poiocephalus*, (Jerdon). Southern India.

3. *Br. melanocephalus*, (Gmelin): *Turdoides atriceps*, Temminck. Malay countries, extending northward to Arracan and Tipperah.

4. *Br. cinereoventris*, nobis. Differs from the last in having the nape and under-parts to near the vent of a deep ash-grey, and in its tail-feathers being less deeply tipped with yellow, which is also less bright, while the green of the upper parts is darker and much less yellowish. Length of the wing three inches and a quarter. Inhabits Tipperah.

5. *Br. tristis*, nobis. Also allied to *Br. melanocephalus*, but remarkable for its very plain brown colouring. Length about seven inches, or

nearly so, of wing three and a quarter, and middle tail-feathers three inches, the outermost five-eighths of an inch shorter; bill to gape three-quarters of an inch, and tarse half an inch. Colour plain brown above, darkest on the crown, wings and tail, the caudal feathers being dusky, with pale tips to the outer ones; under-parts paler, especially on the abdomen and throat: the plumage of the rump copious, as usual, and of a dusky colour, with dull yellowish-brown terminal fringes: bill deep horn-colour, and legs brown. For permission to describe this species, I am indebted to Dr. Theodore Cantor, whose very extensive collection of Malayan birds, &c. when these come to be unpacked and examined, will doubtless yield other novelties. *Br. tristis* inhabits Penang, where it is not very common.

Lastly, as a very aberrant species, may be provisionally ranged

6? *Br. ? criniger*,\* A. Hay. The beak in this bird is vertically much less high than in the others, and altogether the species has a good deal the character of an *Alcippe* (nobis, *J. A. S. XIII*, 384), excepting in its very small tarsi and toes. Length about six inches, of wing two and seven-eighths, and tail the same, its outermost feathers a quarter of an inch less; bill to gape eleven-sixteenths, and tarse nine-sixteenths, the middle toe and claw but half an inch. Colour olive-green above, the coronal feathers, wings and tail, brunnescent; lores, ear-coverts, and the whole under-parts, yellowish, brightest on the belly and lower tail-coverts, passing to whitish on the centre of the throat, and mingled with olive-green on the breast and flanks: three outermost tail-feathers slightly tipped with yellowish on their inner webs. Bill dusky above, and pale below: legs and claws white. The coronal feathers are rounded, and of very different texture from those of the back; the rictal setæ are well developed; and there is a remarkable nuchal tuft of eight or ten straight black hairs, the longest of which are an inch and five-eighths in length in the specimen examined. Inhabits Malacca.

*Microtarsus*, Eyton, *Proc. Zool. Soc.* 1839, p. 102. This is nearly allied to the preceding group.

1. *M. melanoleucos*, Eyton, *ibid.* Common at Malacca.

Finally, *Ixodia*, nobis. Allied to the last genus, and in its squared tail to *Rubigula*. Bill small and compressed, widening very little at base, the tip of the upper mandible but faintly emarginated, and the gape

\* Can this be the *Setornis criniger* of Lesson, the description of which I have not seen? It certainly ranges most properly as a distinct division.

unarmed. Rest as in *Microtarsus*; the head being crestless, and the coronal plumage uniform in texture with the other feathers. The lower tail-coverts of the only ascertained species are bright yellow, as in various species of *Pycnonotus*.

*Ix. cyaniventris*, (nobis,) *J. A. S.*, XI, 792: *Turdus*, No. 6, Raffles, *Lin. Trans.* XII, 311. Common in the vicinity of the Straits of Malacca.

The next is a very remarkable group, which begins now to exhibit a variety of species, and of generic modifications of form, which will ultimately indicate its true place in the system. Not long ago, its only ascertained representative was the *Paradoxornis flavirostris* of Gould: but the following may now be referred to it.

1. *Conostoma æmodius*, Hodgson, *J. A. S.* X, 856. Nepal.

2. *Paradoxornis flavirostris*, Gould, *P. Z. S.* 1836, p. 17; *Mag. Zool. and Bot.* 1838, p. 513; *Icones Avium*, pl. VI: *Bathyrhynchus brevirostris*, McClelland, *Ind. Rev.* 1838, p. 513. Especially characterized, generically, by the deep sinuation of the tomixæ of its mandibles. Hab. Eastern Himalaya, and the mountains of Assam.

3. *Heteromorpha unicolor*, Hodgson, *J. A. S.*, XII, 448. Nepal.

4. *H. ruficeps*; *Paradoxornis ruficeps*, nobis, *J. A. S.*, XI, 177. Bootan mountains, and those of Arracan: Darjeeling.

*Chleuasicus*, nobis, *n. g.* Nearly allied to *Suthora*, Hodgson (*Ind. Rev.* 1838, p. 32, and *J. A. S.* XII, 449), from which it is distinguished by the considerably larger proportionate size of the legs, and by the rather larger and decidedly broader bill, the outline of which (as seen laterally) is still more tumid and anomalous-looking. Rest as in the other genera of the group.

5. *Chl. ruficeps*, nobis. Length five inches and a half, of which the tail measures two and three quarters; wing two and five-eighths; bill to forehead (through the feathers) three-eighths of an inch in a straight line; and tarse seven-eighths; the latter, with the toes and claws, thicker and stouter than in *Suthora*. Colour as in my *Heteromorpha ruficeps*, but the under-parts white, or less tinged with rufescent: *i. e.* the head and neck are bright ferruginous; the rest of the upper parts olive-brown, more or less inclining to ferruginous, especially towards the shoulder of the wing; and the entire under-parts are white: bill whitish horn-colour, apparently tinged with green in the recent specimen; and the legs appear to have been greenish-plumbeous. From Darjeeling.

6. *Suthora nipalensis*, Hodgson. Nepal, Darjeeling.

7. *S. fulvifrons*, Hodgson. Length five inches, of which the tail measures two and a half, its outermost feathers an inch and a quarter less; wing two inches and one-eighth; bill to forehead (through the feathers) a quarter of an inch; and tarse three-quarters. Upper parts light rufescent-brown, inclining to fulvous on the forehead, throat, and breast, with a broad pale duskyish streak along each sinciput; secondaries, and base of caudals, broadly margined with bright chesnut-fulvous; the belly and flanks albescent-greyish. Bill pale, dusky along ridge of upper mandible; and legs light brown. From Nepal.

In XII, 443, I expressed an opinion that the division *Heteromorpha*, Hodgson, should merge in *Paradoxornis*; but I have since seen Mr. Gould's figure of *P. flavirostris* in the *Icones Avium*, which induces me now to follow Mr. Hodgson's arrangement, and also to refer No. 4 of the above list to his genus *Heteromorpha*.

The Indian Nuthatches and Tree-creepers may be enumerated as follow:—

1. *Sitta formosa*, nobis, *J. A. S.* XII, 938, 1007. Darjeeling. Beak scarcely at all compressed, and tapering almost evenly from the base, as seen from above.

2. *S. himalayana*, Jardine and Selby, *Ill. Orn.* 1st series, pl. CLXIV; to which I suspect must be referred *S. cinnamoventris*, nobis, *J. A. S.* XI, 459, though it does not quite accord either with the figure or description. The sexes differ as in *S. castaneovertris*, but the under-parts of the male are not quite so dark as in the corresponding sex of that species; and the deep rufous-brown colouring extends up to the throat, and in some specimens leaves little white on the chin, but the sides of the throat over the jaw are always white, as equally in *S. castaneovertris*. *S. himalayana* is stated to have the tail black, except its middle pair of feathers, the rest having "the basal half [probably a mistake] of the inner webs white; on the outer feather there is an oblique white bar, and the second has a round white spot on the tip of the inner web." In *S. cinnamoventris*, the outermost tail-feather has an oblique white bar towards the middle of its external web, and a larger white spot near the extremity of its inner web; and the next two feathers have each a successively smaller spot on their inner webs; the bill also is much longer than that of *S. himalayana* is represented in the figure, and is black with more or

less white at base; and the legs are certainly not yellow, as those of *S. himalayana* are coloured in the plate, but appear to have been plumbeous, with yellow on the soles. Another discrepancy of *S. cinnamoventris* with the figure of *S. himalayana*, consists in the black of the loreal region not extending upon the forehead, whereas it would appear represented to do so in the figure of the other. Nevertheless, I still suspect that they will prove identical. As for the *Indian Nuthatch* of Latham (*Gen. Hist.* IV, 73), it is not very clear to which species this is to be referred. The beak of *S. cinnamoventris* is distinctly compressed, but broad and stout. It appears to be peculiar to the Himalaya.

3. *S. nipalensis*, Hodgson, *J. A. S.* V, 779. Himalaya. A small species, with remarkably short bill, tapering evenly from the base, as viewed from above.

4. *S. castaneoventris*, Franklin, *P. Z. S.* 1831, p. 121; J. and S., *Ill. Orn.* 1st series, pl. CLXV. Hilly regions of the Indian peninsula, extending to the Rajmahl district of Bengal. Bill very much compressed and narrow.

5. *Dendrophila frontalis*, (Horsf.) Swainson: *Sitta corallina*, Hodgson, *J. A. S.* V, 779. Hilly parts of India generally, from the Himalaya southward, and also of the Malay countries: common in Arracan.

A *D. flavipes* is likewise alluded to by Mr. Swainson in his 'Classification of Birds', p. 318, citing "pt. V, No. 130," it may be presumed of Temminck's *Planches coloriées*.

6. *Tichodroma muraria*, (L.) Illiger. The Rock or Wall Creeper of Southern Europe. Common in the Himalaya, as also in Western Asia. Mr. Vigne remarks, that it "is found throughout the Alpine Punjab, displaying the delicate scarlet patch upon its grey wings, as it flits over the perpendicular banks, with the movements of a butterfly rather than of a bird." *Travels in Kashmir*, &c. II, 20.

7. *Certhia himalayana*, Vigors, *P. Z. S.* 1831, p. 174.

8. *C. discolor*, nobis. Distinguished by having the entire underparts uniform dingy brown, or very much sullied albescent (inclining in some to whitish on the abdominal region), and no ferruginous on the flanks, but only on the lower tail-coverts; whereas in the preceding species the underparts are pure white, tinged with ferruginous on the sides of the breast, and the flanks as well as the lower tail-coverts are deep ferruginous: the upper-parts also are a shade less rufous than in



*C. himalayana*, and the pale central spots to the feathers are more diffused (*i. e.* much less defined), especially those of the head. Upon a first view, it might be thought that the under-parts of *C. discolor* are merely dirty; but the colour is not to be washed out, and five specimens before me are all quite similar, while in three Nepal specimens of the other the white is alike pure, and the flanks deep ferruginous. It is indeed possible that neither of these is the true *C. himalayana*, in which case the Nepal species might be designated *C. nipalensis*, Hodgson. *C. discolor* is common at Darjeeling.

There is a *Certhia spilonota*, Franklin, *P. Z. S.* 1831, p. 121, with "tail soft and flexible (!), in which respect it differs from the type of the genus, but it agrees in all others." It therefore cannot, however, be properly classed in *Certhia*, and requires to be re-examined. Neither Mr. Jerdon nor myself have been able to identify it. "*C. supra griseo-fusco, albo maculata; capite albo graciliter striato; gula abdomineque albidis, hoc fusco fasciato; caudâ albo fuscoque fasciatâ. Longitudo*  $5\frac{1}{2}$  *unc.*" Major Franklin's specimens were collected on the Ganges between Calcutta and Benares, and in the Vindhyan hills between the latter place and Gurrah Mundelah, on the Nerbudda.

*Accentor mollis*, nobis. This fourth species of Himalayan *Accentor* (vide *J. A. S.* XII, 958 *et seq.*) is about six inches long, of which the tail occupies two and a half; wing three and a quarter; bill to frontal feathers five-sixteenths of an inch; and tarse three-quarters of an inch. Colouring soft and delicate. Upper parts a rich brown, passing into pure dark ash-colour on the head and neck, and into maronne on the scapularies and tertiaries, and less deeply on the hind part of the back; coverts of the secondaries pure dark grey, those of the primaries, with the winglet, black, as are also the primaries, these last having their unemarginated portion externally bordered with pale grey; tail greyish-dusky; frontal feathers to above the eyes margined with white, the lores blackish, and the entire under-parts slightly embrowned deep ash-colour, as far as the vent, which is pale and tinged with ferruginous, the under tail-coverts being deeper ferruginous, and the hind portion of the flanks dark ferruginous: bill blackish; and feet pale, having probably been tinged with yellow. From Darjeeling.

"The species of this genus," remarked Mr. Yarrell not long ago, "are very limited in number, only five, I believe, being at present known. Two are figured in this work [*'History of British Birds,'*] as belonging

to England [one of these, however, being there only known as an excessively rare straggler]; two others are found in the north and east of Europe\*; and a fifth has been received from the Himalaya mountains. M. Temminck includes *A. alpinus* in his catalogue of the birds of Japan." The discovery of four Himalayan species, all different from those of Europe, is accordingly no small accession to the known species of the present group; and it is likely that the mountain ranges of Central Asia will be found to yield several more.

*Locustella rubescens*, nobis. Without having a specimen of the British *L. Raii* for comparison, I sufficiently well remember that bird (of which I have shot many) to be enabled to state that the present one is a true Locustelle, having merely a rather shorter tail, and the legs (I think) are somewhat stouter than in its British congener. The general characters, however, are quite the same. Length six inches, by seven and three-quarters in spread of wing; the closed wing two inches and a half; and tail two inches, its outermost feathers half an inch less; bill to gape three-quarters of an inch, and tarse seven-eighths. Irides dark hazel. Bill dusky horn, pale at base of lower mandible; and legs light brown. Colour of the back ruddy-brown, with black centres to feathers; of the crown dusky, with olivaceous lateral margins to each feather; sides of neck plain olivaceous, as are also those of the breast; throat and belly white, the front of the neck tinged with fulvescent-brown, which is likewise the hue of the flanks; lower tail-coverts fulvescent-brown, the longer of them darker with whitish tips; rump and tail dark ruddy-brown, all but the middle feathers of the latter slightly tipped with grey, with traces of barred markings of the same underneath; wings dusky, the coverts margined with olivaceous, and the large alars with ruddy-brown; tips of the tertiaries a little albescent; a narrow whitish line from bill to occiput, and slight medial dusky lines on the hindmost feathers of the flanks. A single specimen of this bird was shot in the neighbourhood of Calcutta, in the month of March. On dissection, the muscles of its legs were observed to be very thick, with stiff rigid tendons, as in the British Locustelle.

\* Surely that of northern Europe here alluded to, is not the so-called *A. calliope* of M. Temminck, v. *Calliope camtschatkensis*, (Lath.)? : a bird common in Lower Bengal during the cold season, but certainly having no particular affinity for *Accentor*.

*Tribura luteoventris*, Hodgson. Nearly allied in form to the preceding, but the tail much more graduated (as in *Locustella Raii*), and the bill rather more compressed, with the ridge of the upper mandible more decidedly raised and acute towards its base. I suspect that it pertains to the division *Pseudoluscinia*, Bonap. Length about five inches and a half, of which the middle tail-feathers measure two and a half, the outermost being an inch shorter; wing two inches; bill to gape nine-sixteenths of an inch, the latter quite smooth (as in *Locustella*); tarse three-quarters of an inch; claws fine, and but moderately curved, the hind-claw measuring half an inch. Upper parts uniform olive-brown; the lower paler, except the flanks, which are also a little rufescent; throat and middle of the breast and belly inclining to whitish; bill dark horn-coloured above, and pale below; and legs light brown. Inhabits the Kachar region of Nepal.

Mr. Hodgson gives the following generic characters of his *Tribura*. "Bill equal to the head (measured to gape), straight, compressed, at base high as broad, with the ridge raised and keeled between the oval nares: tip of upper mandible very slightly inclined, but distinctly (though minutely) notched: rictus quite smooth. Wings short and rounded, the two first quills conspicuously and equally gradated, the three next subequal and longest. Tail somewhat elongated and gradated equally throughout, rather cuneated than fan-shaped. Tarse medial, stout [or rather, of moderate strength], smooth, longer than the middle toe and nail: toes and nails slender and simple, compressed and elongate; inner lateral with its nail exceeding the outer; the hind toe least, and not broad. Feet of terrene model,"—being much as in the British *Locustella*, which bird I have seen on the ground, among furze bushes, I think with an ambulatory gait.

*Dumeticola*, nobis, *n. g.* A specimen sent by Mr. Hodgson with the M.S. name *Salicaria affinis*, would fall under M. Temminck's division of *Bec-fins aquatiques*, but would scarcely have been referred by Mr. Selby to his *Salicaria* (now dismembered, and its component species assigned to previously established divisions). Nearly allied to the last species, it departs further from the *Salicaria* model, and approaches more to that of *Prinia*, and especially of *Horeites* (hereinafter described): having comparatively full and puffy plumage, and a less cuneated tail, inasmuch as the three middle pairs of feathers graduate but slightly; the first primary is also rather shorter, and the second rather

longer, than in *Tribura* (v. *Pseudoluscinia* ?) *luteoventris*. The bill is shaped somewhat as in *Cinclus*, but is proportionately shorter, with the peculiarities of that form less developed ; the nareal apertures are quite basal ; and the gape smooth, as in the preceding : feet also similar, but the claws slightly longer and straighter.

*D. thoracica*, nobis. Length five inches, of which the tail measures two inches, its outermost feathers seven-eighths of an inch less ; wing two and one-sixteenth ; bill to frontal feathers three-eighths of an inch, and to gape above half an inch ; tarse three-quarters, and hind claw five-sixths of an inch. Upper-parts dark olive-brown, with a faint ruddy tinge on the lower part of the back ; throat and above the lores white, passing into ashy on the breast, which, with the fore-neck, is marked with largish round dusky spots ; lower portion and sides of the breast plain brownish-ashy, the medial portion of the belly white, and the flanks fulvescent-brown ; under tail-coverts dark olive-brown, with whitish tips : bill dusky, and legs and claws pale. Inhabits Nepal.

*Horornis*, Hodgson, is placed by that naturalist as a subgenus of his *Tribura* (*Pseudoluscinia* ? Bonap.), having "the bill feeble, and the tarse sometimes distinctly scutellated : wings and tail as in *Nivicola*" (note to p. 585).—I have a hasty note of the second species below described, (from a specimen taken to England by Mr. Hodgson,) as being "intermediate to *Prinia* and *Tesia*, having the bill slender and compressed, much as in *Locustella*, with the rictorial hairs scarcely perceptible ; tail rather short, and much graduated ; wings the same, the first quill but half the length of the second, the fourth and fifth equal and longest, a little exceeding the third and sixth."

*H. flaviventris*, Hodgson. (*Non vidi*.) "Above olive-green, below pale yellow ; chin and line over eye albescent ; legs fleshy ; bill dusky-brown. Length four inches and three-eighths ; bill half an inch ; tail an inch and five-eighths ; wing under two inches ; tarse thirteen-sixteenths ; central toe and nail eleven-sixteenths ; hind nine-sixteenths. Hab. the Cachar, or *juxta*-Himalayan region of the hills."

*H. fortipes*, Hodgson. "Bill slender, with notch and inclination distinct ; rictal hairs distinct. Tail broad, soft, fan-shaped. Legs strong, and frequently smooth. Wing as in *Tribura*, more or less pointed, and not absolutely rounded as in *Horeites*. Above olive-brown ; below white : the flanks, vent, and eye-brows, yellowish. Legs and bill fleshy-white ; the bill more sordid. Length four inches

and five-eighths; bill half an inch; tail under two inches; wing two and one-sixteenth; tarse above fifteen-sixteenths; central toe and nail eleven-sixteenths; hind nine-sixteenths. Hab. the Cachar." Hodgson's *MSS*. — The following description was taken by myself from the specimen before alluded to. Length about four inches and a quarter, of wing two inches, and tail an inch and a half, its outermost feather half an inch shorter: bill to gape five-eighths of an inch; and tarse three-quarters of an inch. Colour uniform dark olive-brown above, below pale ochraceous-brown, approaching to albescent; flanks and lower tail-coverts dark brown, the latter margined paler; bill dusky above, below paler; legs also pale.

*Horeites*, Hodgson. "Bill shorter than head, quite straight, usually distinctly notching; nares covered with a scale. Wing as in *Prinia*. Tarse high, as in *Prinia*, but the toes less repent, ambulant in fact, with the laterals equal and freer, and the central longer; nails slender and *Sylvian*, not *Parian* as in *Orthotomus*. Tail short [or rather, I should say, of moderate length], narrow [I should rather term it somewhat broad], rounded as in *Orthotomus*, but without the *Merops*-like elongation of the centrals." Hodgson's *MSS*.—According to my ideas, these birds approach a good deal to the genus *Tesia*, particularly to *T. flaviventris*; but have a more slender bill, a well developed, cuneiform, broad and soft, tail the feathers of which are much graduated, and the general character tends distinctly towards *Pseudoluscinia* and its allies. Mr. Hodgson describes two alleged species, "exclusively confined to the northern region of the hills, near the snows."

*H. brunnifrons*, Hodgson. "Above olive-brown, [slightly] redder on wings and tail; cap red-brown. Below sordid white [pale ashy], pure centrally. [Bill dusky above, pale beneath; and the legs pale.] Length four inches; bill half an inch; tail an inch and five-eighths; wing the same [varying from this to nearly two inches]; tarse three-quarters; central toe and nail five-eighths; hind seven-sixteenths."

*H. pollicaris*, Hodgson. "Above dark olive, below and the eye-brow yellowish. Legs and bill fleshy-grey. Length three inches and a half; bill seven-sixteenths; tail an inch and five-eighths; wing the same; tarse thirteen-sixteenths; central toe and nail five-eighths; hind half an inch. Has a slender, *Regulus*-like, bill, and very short, extremely rounded, wings. Its tarse is remarkably elevate, and scutellate

to the front, and its toes are compressed and ambulant, but with a remarkably large thumb for such a foot." From a specimen taken to England by Mr. Hodgson, I took the following note.—"Probably only the young of *H. brunnifrons*, from the adults of which it differs in the colour of the head being uniform with that of the back, and the under-parts less albescent and devoid of any ashy tinge, being slightly washed with yellowish. "These birds constitute a *nivicolan* or northern hill group, representing the *Prinia* of the plains of India." Hodgson's MSS.\*

*Tesia*, Hodgson (February, 1837): *Microura*, Gould (August, 1837). Of this curious genus, the following species may now be enumerated.

1. *T. cyaniventer*, Hodgson, *J. A. S.*, VI., 101: *Saxicola* ? *olivea*, McClelland and Horsfield, *P. Z. S.*, 1839, p. 161. Bright olive-green above, slaty below. Nepal, Darjeeling, Assam.

2. *T. castaneo-coronata*, (Burton), *P. Z. S.* 1835, p. 152: *T. flaviventer*, Hodgson, 1837. Bright olive-green above, vivid yellow below, with the crown and ear-coverts a lively reddish-chesnut. Nepal.

3. *T. squamata*, (Gould), *Icones Avium*: var. A, *T. rufiventer*, Hodgson, *J. A. S.* VI, 102; Var. B, *T. albiventer*, Hodgson, *ibid.*; Var. C, *T. concolor*, Hodgson, *MS.* I believe these to be all different phases of plumage of the same species, and therefore venture upon

\* The following, to judge from specimens presented to the Society by Mr. Hodgson, so far from being generically different, appears to me to be identical in species with *Horeites brunnifrons*, presenting at most but an individual diversity, such as may commonly be seen in different specimens of *Prinia inornata*, or *Cysticola cursive*, shot out of the same little society; but I nevertheless give Mr. Hodgson's diagnosis, as follows:—

*Nivicola*, Hodgson, "Bill still shorter, feebler, *Regulus*-like, with the notch evanescent: wings and tail broader, firmer, ampler than in any of the above: tail fan-like. Wings not absolutely round; the fifth quill longest; the two first nearly, the next little, and both *inter se* equally, graduated. Tarses medial: toes simple, ambulant. Habitat the Cachar, near the snows.

"*N. schistilata*, H. Above olive-brown, below white, and laterally pale slaty-blue. Legs fleshy, bill pale. Cap on crown brunnescens. Coloured very like our *Horeites brunnifrons*, but decidedly different in structure, with longer wings, broader and firmer tail, and more ambulant feet, of which the central digit is long, the laterals equal and nearly free, and the hind least and compressed. Length four inches and a quarter; bill half an inch; tail two and one-sixteenth; wing one and fifteen-sixteenths; central toe and nail ten-sixteenths; hind half an inch, or less." Hodgson's MSS.

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adopting the specific name bestowed by Mr. Gould; in preference to either of those given by Mr. Hodgson, as being alone applicable to the species generally. However stringently rules may be drawn up, such as the very excellent "Series of Propositions for rendering the Nomenclature of Zoology uniform and permanent," adopted as the Report of a Committee appointed by the 'British Association' for the consideration of this subject, cases will still arise, now and then, in which a naturalist must rely upon his own judgment, and indeed the present one may be brought under § 11 of the "Propositions," by which "a name may be changed when it implies a false proposition which is likely to propagate important errors." For a precedent, I cite the *Neomorpha Gouldii* of Mr. G. R. Gray, it having been ascertained that the *N. acutirostris* and *N. crassirostris* of Gould were merely the different sexes of the same bird. At the same time, I most fully concur in the remark, that "this privilege is very liable to abuse, and ought therefore to be applied only in extreme cases, and with great caution." In the present instance, it may be justly urged in favour of Mr. Gould's specific name, that the bird having been *figured* by that naturalist as *Microura squamata*, it is already better known by that denomination than by any other, and that the proposed alteration, so far from being likely to induce confusion, is, on the contrary, calculated to remove a source of error, such as would result from the exclusive adoption of either of Mr. Hodgson's appellations to the species in all its phases. I might even have hesitated in proposing an entirely new name for the bird in question; but that given by Mr. Gould has not only already obtained currency, but was besides very nearly contemporaneous with the partially applicable ones bestowed by Mr. Hodgson. Certainly, the characters and dimensions of the three alleged species correspond exactly; and it will be seen that Mr. Gould's second figure represents a specimen just midway between *T. albiventer* and *T. rufiventer*, while an example presented to the Society by Mr. Hodgson of his *T. concolor*, is of a uniform brown colour all over, with a slight ashy shade on the under parts; but retains two or three white-margined feathers on the breast resembling those of ordinary *albiventer*, with which it quite accords in all other particulars, and is decidedly of the same species. A second specimen is plain brown above, with white throat, and white margins to the feathers of the breast and belly, decreasing on those of the flanks. A

third has pale terminal specks on the feathers of the upper parts, larger and elongated on those of the head, and the white of the underparts much as in the last, but rather more developed. This variation of plumage is instructive, and a knowledge of it may prevent a multiplication of factitious species. Inhabits Nepal, and Darjeeling.

4. *T. pusilla*, Hodgson, n. s. Size and proportions of the next, but the bill rather longer, and the tail barely exceeding half an inch. In general aspect it much resembles the *rufiventer* variety of the last. Upper parts dark brown, the wing-coverts having terminal pale dots: lores and under parts of a light wood-brown, the feathers slightly margined with black; those of the flanks chiefly dark, with brown margins, and the extreme edge black, like the rest. Bill dusky above, and legs horn-brown. Inhabits Nepal.

5. *T. caudata*, nobis. Length three inches and five-eighths, of which the tail measures an inch, being considerably more developed than in the other species of analogous tone of colouring; wing an inch and three-quarters; bill to forehead seven-sixteenths, and tarse eleven-sixteenths. Upper parts dark and rich olive-brown, the feathers very slightly margined with black, and having also black shafts; throat ferruginous, paling on the breast, where the feathers have black centres and are further tipped with black; the belly similarly marked with dusky-black and white: wings uniform dark reddish-brown; and tail inclining to the same, being also very soft and flexible: lores and orbital region ash-grey: bill blackish; and legs brown. From Darjeeling.

To these may be added the *Troglodytes microurus* of Ruppell, which shews the form to be likewise African.

Mr. Hodgson proposes to restrict *Tesia* to *T. cyaniventer* and *T. flaviventer*, and applies a new name to the others, which, however, if deemed separable, would rank under *Microura* of Gould: unless, indeed, the latter be pre-occupied, in which case the name *Pnoëpyga*, Hodgson, would be admissible. The two species cited have a more developed tail; but so has my *T. caudata*, which nevertheless decidedly belongs to the *Microura* section; and Mr. Hodgson further points out that *T. cyaniventer* has the bill flatter at base, while in *T. flaviventer* the nareal scale, conspicuous in the others, is barely traceable: nevertheless, I do not see that they can be justifiably separated. According to the same naturalist, "these singular birds are solely mountaineers, dwelling in humid retired woods, where under-cover abounds. They



are solitary and silent; and they breed and nestle on the ground, and feed on insects and small seeds. Stomach a perfect gizzard.”\*

*Troglodytes nipalensis*, Hodgson. Differs from the European Wren in its much darker colouring, in having the back a great deal more barred, the under-parts throughout distinctly barred, and more closely so than the upper-parts, and the bill somewhat shorter and a little more widened at base. Length of wing an inch and seven-eighths. Nepal.

*T. punctatus*, nobis. Size of the European species: the bill shorter, and vertically much deeper. Length of wing an inch and three-quarters, and of tail an inch and a quarter. Upper parts fuscous-brown, with a pale speck at the extremity of each feather, some of these specks being white or nearly so; tail barred as in the European Wren, but the feathers softer and more graduated; tertiaries comparatively broad, their ground-colour a dark mahogany, as is likewise the colour of the bars on the outer webs of the primaries. Under-parts delicately mottled, a good deal in the manner of the scapularies of a Wryneck (*Yunx torquilla*), but the pale spots much more numerous on the breast, and nearly obsolete on the belly, which last has a fulvous tinge. Bill dark horny; and the legs appear to have been pale. Inhabits Darjeeling.

*Orthotomus cineraceus*, nobis. This nearly approaches the *Orth. edela*, (Tem., v. *Edela ruficeps* of Lesson, and *Motacilla sepium* of Raffles, nec *Orth. sepium*, Horsf., vide *J. A. S.* XIII, 378), except that the upper-parts are pure ash-grey, without any tinge of green, whereas in *Orth. edela*, according to Raffles, the “back, wings, and tail,” are “dusky green.” The forehead and sides of the head are light ferruginous, palest on the cheeks, and there is a slight tinge of the same upon the chin; crown tinged with olive-brown; lower parts white, passing to light ashy on the sides of the breast; tail somewhat brownish, with terminal dusky band, and whitish extreme tips to its

\* There is an allied (or rather, analogous,) South American form, which, I understand, is the *Leptorhynchus* of Menetries, but which name is pre-occupied; and the following species of it appears to be undescribed, in which case it may bear the specific name *subluteoventris*. Length two inches and seven-eighths; of wing one and five-eighths; tail five-eighths: bill to gape nearly five-eighths; and tarse the same, being with the toes much smaller than in *Tesia*. Upper-parts black, the feathers laterally margined with light brownish-yellow; lower-parts clear yellowish-white, whitish on the throat: a dark line from base of lower mandible; and central dark lines to the feathers of the sides of the neck, and of the fore-part of the breast. Bill dusky above, pale beneath; and legs albescent-plumbeous. Probably from Guiana.

outer feathers; tibial plumes rust-coloured, the tarsi and toes red-brown, and bill dusky above, the lower mandible pale. The middle tail-feathers are not elongated in the only specimen under examination. Length about four inches and a half, the wing an inch and thirteen-sixteenths, and tail one and five-eighths; bill to gape three-quarters of an inch, and tarse five-eighths. Common at Malacca.

*Prinia*, Horsfield. Of this genus, I have no species to describe additional to those noticed in Vol. XIII, p. 376, but may remark that Mr. Jerdon considers that two or three are at present confounded under *Pr. inornata*: considerable variation, however, certainly obtains in individuals shot out of the same flock; and it may be noted that this bird extends its range into Arracan. *Pr. Franklinii*, nobis, (v. *macroura*, Franklin, nec Latham), being the *Sylvia longicaudata* of Tickell, *J. A. S.* II, 576, will now bear that as its specific name: and *Pr. cursitans*, Franklin, as I am informed by Mr. Strickland, "is decidedly congeneric with the European *Cisticola schænicola*, but differs in being more rufous, &c. I have compared them," he adds, and it may be further noticed that the *cursitans* is common in Lower Bengal.\*

*Neornis*, Hodgson. This name was applied by Mr. Hodgson to my *Culicipeta* (*J. A. S.* XII, 968), but he has since referred to it two alleged species as aberrant representatives of the form, which appear to me to have an obvious claim to typify a distinct genus, in denomination of which I propose that the above name should be retained. General form of *Prinia*, but with the bill and the colouring of *Phylloscopus*, and long hair-like rectal setæ.

*N. flavolivacea*, Hodgson. "Above olive-green; below and the eyebrow, luteous-yellow [dull pale yellowish]. Length five inches; bill half an inch; tail two inches and three-eighths; wing two and five-sixteenths; tarse five-sixteenths; central toe and nail five-eighths; hind nine-sixteenths." Hodgson's *MSS.* Bill dusky, base of lower mandible pale; legs brown, the tarse pale externally. Nepal.

*N. cacharensis*, Hodgson. "Above luteous-olive; below buff; eyebrow pale. Length four inches and three-quarters; bill nine-sixteenths; wing two inches: tarse seven-eighths; central toe and nail

\* Since the above was written, I have seen three specimens of *Pr. socialis* from Agra, which, though similar in plumage, are smaller than one sent by Mr. Jerdon from S. India, and have the bill considerably smaller.—A species very closely allied to (if indeed different from) *Pr. sylvatica*, Jerdon, has also been received from Java.

five-eighths; hind half an inch." *Ibid.* N. B. I greatly suspect that this is merely the young of the preceding, from comparing a specimen sent by Mr. Hodgson of the latter, with a description I took of the former from a specimen which that naturalist took with him to England.

The *Prinia olivacea* and *Pr. icterica*, Strickland, *P. Z. S.*, June, 1844, are two species from Fernando Po, which are probably referable to this type.

*Phylloscopus*, Boie. This genus is greatly developed in India, and the species may be ranged into three sections.

Firstly, those immediately allied to *Ph. trochilus*, &c. of Europe, of which I have already described six, as occurring in the vicinity of Calcutta during the cold season. These are,—1. *Ph. fuscatus*, nobis, *J. A. S.* XI, 113. Of this I have now obtained several specimens, and one or two have been forwarded from Arracan,—2. *Ph. javanicus*, (? Horsf.); *Ph. magnirostris*, nobis, *J. A. S.* XII, 966. Rare in the neighbourhood of Calcutta, and occurs likewise in Arracan,—3. *Ph. lugubris*, nobis, XII, 968. Common, and also occurs in Southern India,—4. *Ph. viridanus*, nobis, XII, 967. Very common, and abundant also in the Himalaya and in Arracan,—5. *Ph. tristis*, nobis, XII, 966. Common in swampy places, wherever there is jungle; and diffused generally over India,\*—6. *Ph. nitidus*, nobis, XII, 965. India generally. To these may now be added—

7. *Ph. brunneus*, nobis. Length about four inches, of wing two and three-sixteenths, and tail one and three-quarters; bill to gape exceeding half an inch, and tarse three-quarters. A plain brown species, distinguishable from *Ph. tristis* by the more cinerascens shade of its upper parts, by the absence of any yellow on the axillaries and beneath the shoulder of the wing, which is replaced by faint rufous, by the pale colour of the lower mandible and of the legs, and by the shape of its tail, of which the outermost feathers are a quarter of an inch shorter than the middle ones; lower parts brownish-albescent. From Arracan, where procured by Captain Phayre.

8. *Ph. affinis*, (Tickell), *J. A. S.* II, 576: *Sylvia indica*, Jerdon. Indian peninsula. (*Non vidi*, and the identification of these is due to Mr. Jerdon.)

\* I also found this species in great abundance in a mango tope near Hooghly, where there was no marshy ground in the immediate vicinity.

There are others in the Himalaya, which I formerly considered identical with *Ph. trochilus* and *Ph. rufa* of Europe; but I had no specimens of the latter to compare them with. *Ph. trochilus* is stated by Mr. Gould to have been received from Western India, and by M. Temminck from Japan; and *Ph. sibilatrix* is enumerated in Dr. Royle's list, but the allied *Ph. nitidus* may have been mistaken for it. The species of this genus require very minute examination.

Mr. Hodgson separates those which have a pale coronal mesial line, and, in some instances only, rather a thicker bill, approaching in form to that of *Phyllopneuste*, by the same *Abrornis*. I can only regard them as forming a slight section of the genus: and the next might form an analogous third section.

*Ph. schisticeps*, (Hodgson). Resembles *Culicipeta Burkii* (*J. A. S.* XII, 968, v. *Muscicapa bilineata*, Lesson, v. *Cryptolopha auricapilla*, Swainson,) in colouring, except that the head and nape are uniform deep ash-grey; having the rest of the upper-parts bright yellowish-green, the entire under-parts deep yellow, and the two outer tail-feathers white on their inner web: the bill, however, is not depressed, as in the *Culicipeta*, but is thicker than usual (approaching in this respect to *Phyllopneuste*), and comparatively short: the claws also are shorter, stronger, and more hooked, than in *Culicipeta*, better adapted for clinging, as in other *Phylloscopi*. Length about four inches and a quarter, of wing two inches to two and one-eighth, and of tail an inch and five-eighths; bill to gape half an inch; and tarse five-eighths: colour of bill blackish above, yellow below; and of feet yellowish. The young have looser plumage, and all the colours less intense. Inhabits the Himalaya, and the mountainous parts of Arracan.

Of the species with pale mesial coronal streak, I have already described *Ph. reguloides*, *J. A. S.* XI, 191, and XII, 963,—and *Ph. modestus*, (Gould), *ibid.*,—both of which occur likewise in the Himalaya and in Southern India, and the latter in Arracan. To these may now be added—

*Ph. pulcher*, (Hodgson). Allied to *Ph. modestus*, but larger, and distinguished by having the three outer tail-feathers wholly white, with the exception of the terminal half of their outer webs, together with the tip of the inner web of the ante-penultimate, and slightly of the penultimate feathers. Colour of the upper-parts dark olive-green, with a rufous cast, and two pale rufescent bars across the wings;

beneath dingy pale green; a light streak over the eye, and trace of another upon the centre of the crown. Bill dark above, and pale beneath; the feet brown. Length about four inches and one-eighth, of which the tail measures an inch and five-eighths; wing two and three-eighths, the space between the tips of the first and second primaries three-quarters of an inch: bill to gape half an inch; and tarse nearly three-quarters. Inhabits Nepal.

*Abornis castaniceps*, Hodgson. "Above vernal-green: belly, vent, and croup, deep yellow. Chin to belly white, passing laterally to soft plumbeous. Top of head chesnut, bounded by black to sides. Legs and bill pale. Length four inches; bill three-eighths; tail an inch and five-eighths; wing one and fifteen-sixteenths; tarse three-quarters; central toe and nail seven-sixteenths; hind five-sixteenths of an inch." Nepal. (*Non vidi.*)

*Phyllopneuste*, Meyer, 1822: *Ficedula*, Koch, 1811. The latter term, though having the priority, is objectionable as conveying the idea that these birds are fruit-eaters, like the Fauvettes, which decidedly is not the case.

*Ph. indicus*, nobis. Nearly allied to the European *Ph. hippolais*, termed *Hippolais salicaria* by the Prince of Canino, and *Sylvia polyglotta* by Vieillot. Length about five inches and a half, or nearly so; of wing two and five-eighths to two and three-quarters, its first primary measuring three-quarters of an inch, and the second an inch and one-eighth more, and reaching to within three-eighths of an inch of the extremity of the wing; tail two inches and a quarter; bill to gape five-eighths; and tarse three-quarters of an inch. Colour dark olive-green above, a little infuscated, especially upon the crown, with a well defined dull pale yellow supercilium; breast tinged with ashy, mingled with dull pale yellowish, the rest of the under-parts dull yellowish-albescent; a slight band on the wing formed by the pale yellowish tips of some of the greater coverts: bill dusky above, and in part below, the rest yellowish, with conspicuous hair-like rictal setæ; and the legs appear to have been pale leaden. Sent from Nepal by Mr. Hodgson, and from Southern India by Mr. Jerdon.

2. *Ph. occipitalis*, Jerdon. Smaller and paler, with a light yellowish mark on the middle of the occiput, flanked on either side with blackish, and then with pale yellowish-green, continued as a supercilary streak from the bill; the first of these markings corresponding

with the termination of the coronal streaks of *Culicipeta Burkii*, of *Phylloscopus reguloides*, and of certain other species of the latter genus. Colour ashy-green, purer green on the wings and rump; a slight whitish cross-band on the wing, formed by the tips of the greater coverts; lower-parts dull albescent throughout; shoulders of the wings inferiorly, with the axillaries, yellow: bill duskyish above, pale yellow below; and legs yellowish-brown. Length four inches and three-quarters, of which the tail is an inch and seven-eighths; wing two inches and three-quarters; bill to gape five-eighths; tarse eleven-sixteenths. Southern India, where discovered by Mr. Jerdon.

3. *Ph. rama*, (Sykes), *P. Z. S.* 1832, p. 89. Common in Southern India.\*

*Calamoherpe*, Boie (1822). Three species of this genus are common in Bengal, and it would seem over India generally; visiting the plains, however, only during the cold season.

1. *C. arundinacea*, (? Lin.)†: *Sylvia turdoides*, Tem.; *Agrobates brunnescens*, Jerdon. This bird requires, however, to be actually compared with European specimens. Length of a female seven inches and three-quarters, by ten and a half in expanse; wing three and five-eighths; tail three and three-eighths; bill to gape an inch and one-sixteenth; and tarse one and one-eighth.

2. *C. montana*, (Horsfield). Very common, and comes a good deal into gardens, frequenting pea-rows and the like. In wilder marshy districts, such as the swampy thickets in the vicinity of the salt-water lake near Calcutta, not one is to be met with, while both the other species abound; and the next is rarely seen in the haunts of *C. montana*. *Prinia flaviventris* and *Phylloscopus tristis* frequent the same places as *C. agricola*, but keep more to the higher jungle where there happens to be any; and I have observed no other *Phylloscopus* or *Prinia* in the localities proper to those above mentioned. *C. montana* measures five inches and three-quarters, by seven and a quarter; wing

\* I have just been looking over the series of these birds with Lord Arthur Hay, and it is his lordship's opinion that *nitidus* should be referred to *Phyllopneuste*, (in which case I believe that the British *sibilatrix* should accompany it,) and that *reguloides* and *pulcher* should rank in *Culicipeta*; which, I think, would certainly bring *schisticeps* into the same division. His lordship does not quite agree with me in referring *modestus* to *Phylloscopus*, but I cannot bring myself to accede to placing this last bird as a *Regulus*.

† Prof. Behn assures me, that this is certainly distinct from *Turdus arundinaceus*, Lin., of Europe; in which case it must stand as *C. brunnescens*, (Jerdon).

two inches and a quarter to two and three-eighths; tail two and a quarter: bill to gape three-quarters; and tarse seven-eighths of an inch. As compared with the British *C. salicaria*, (*Sylvia arundinacea*, apud Temminck,) the tinge of the upper-parts, breast and flanks, is much less brown, and the beak is less compressed, although vertically deeper. The next species has a nearer affinity for the British bird, both in form and colouring; but is smaller, with a distinctly smaller bill, and the supercilium is carried backward beyond the eye, which is not the case in *C. salicaria*.

3. *C. agricola*, Jerdon. Less than the preceding, with a proportionally smaller bill, and more rufous colouring. Length four inches and a half, by six and seven-eighths; wing two and a quarter; tail the same; bill to gape five-eighths; and tarse seven-eighths. A specimen procured at Cabool by the late Sir Alexander Burnes agrees perfectly with others obtained near Calcutta and in Southern India.

*Arundinax*, nobis. This genus was first detected by Mr. Jerdon, among a number of specimens of *Calamoherpe arundinacea* (?), which the only species as yet ascertained a good deal resembles, on a superficial view. Several specimens were soon after procured by myself in the vicinity of Calcutta; and Captain Abbott also sent it from Ramree, Arracan. Its true affinity, however, is with *Sphenura* and its allies, and not with the preceding group. The bill is somewhat more produced and tapering, slenderer and less laterally compressed, than in *Sphenura*, with barely discernible emargination of the upper mandible, and the rictal bristles are smaller and more slightly curved; rest as in *Sphenura*, but the tail-feathers narrow and much graduated.

*Ar. olivaceus*, nobis. General aspect of *Calamoherpe arundinacea* (?), but at once distinguished by its shorter and thicker bill, and much more graduated tail-feathers. Length eight inches, of which the middle tail-feathers measure three and three-quarters, the outermost an inch less; wing three and one-eighth; and tarse an inch. Colour uniform olive-brown above, a little rufescent towards the tail; throat whitish, and the rest of the under-parts tinged with fulvous-brown; lores also pale: bill dark brown, the lower mandible pale carneous; and legs plumbeous. My impression is, that the sexes are equal in size, as are all the specimens before me,—unlike the sexes of *Sphenura* and *Megalurus*; but I have omitted to note down the fact.

*Gampsorhynchus rufulus*, nobis, *J. A. S.* XIII, 371. Four specimens of this curious bird are now before me, of which two are from Darjeeling, and the others from the mountains of Arracan: and it is remarkable that all of these appear to be partially affected with albinism. All four resemble in having the under-parts vivid white, with a tinge of ferruginous on the flanks; and the upper are bright olive-brown inclining to ferruginous, the tail-feathers tipped paler: all, too, have more or less white on the shoulder of the wing, though reduced to a single feather upon one wing only, of one of them, while another has about half an inch of the shoulder of each wing white, and the rest shew a greater or less admixture of white on the same part: but the crown varies most remarkably, being either pure white or bright ferruginous, or the two variously intermixed, and without either depending on age or season, as new feathers may be seen growing of both. In its affinities, this genus exhibits a very close approach to *Sphenura*, more so than I had recognised upon the examination of the first specimen only; but the more developed bill, and distinctly notched and hooked upper mandible, with the diminished curvature of the rictal bristles, which however are equally rigid, and longer and more tapering, fully authorise its separation from the form of *Sphenura striata*, though it is likely enough that species will eventually be found to connect them by intermediate links.

We have accordingly now the following Indian genera of this group:—*Sphenura*, Licht. (v. *Dasyornis*, Vig. and Horsf.);—*Gampsorhynchus*, nobis;—*Arundinax*, nobis;—*Laticilla*, nobis (olim *Eurycercus*, *J. A. S.* XIII, 374, which name cannot be retained, as it was previously applied to a genus of *Entomostraca* by Dr. W. Baird, in the *An. and Mag. Nat. Hist.*, February, 1843, p. 88);—and *Schænicola*, nobis, XIII, 374: all these being distinct from the extra-Indian (so far as at present ascertained) *Sphenæacus*, Strickland, which again is closely allied\*: so also is *Megalurus*, Horsf. (vide XIII, 372); and we

\* If *le Fluteur* of Levaillant, which is the type of Mr. Strickland's *Sphenæacus*, be correctly figured by Mr. Swainson (who terms it *Malurus africanus*), it would have a much thicker bill than *Sph. gramineus*, Gould, figured in the "Birds of Australia," so much so that the two could scarcely range together in the same minimum group, though in other respects they would seem to resemble very closely. The *Cinclorhamphus cruralis* of Gould, founded on the *Megalurus cruralis*, Vig. and Horsf., is a form nearly allied to true *Megalurus*, and like the latter and also *Sphenura*, the female is very much smaller than the male, this disparity being even greater than in its Indian affines. I have never had an opportunity of observing the habits of *Mega-*



have the *Malacocercus caudatus*, (Dumeril, v. *Timalia chatarrhæa*, Franklin, and *Megalurus isabellinus*, Swainson), and the *Suya criniger* of Hodgson, connecting the present group respectively with the long-tailed *Malacocerci*, and with the *Priniæ*. Indeed, I hardly consider *Suya* to be separable from *Prinia*.

The genus *Malacocercus* treated of in XIII, 367 *et seq.*, has since been further developed by Mr. Jerdon, in the second No. of his 'Illustrations of Indian Ornithology'; and this naturalist now considers that the species which he formerly referred to *Somervillei* of Sykes, and which I followed him in so doing in XIII, 368, is distinct from Col. Sykes's bird; for which reason he has given it the name *malabaricus*.

The proposed genus *Orthorhinus*, nobis, J. A. S. XIII, 371, proves to have been founded on a young example of a new species of *Pomatorhinus*, and must therefore be cancelled: but the species will stand as

*Pomatorhinus hypoleucos*, nobis. Adults, received from Tipperah and Arracan, merely differ from the young before described in the firmer texture of their feathers, and in the elongation and curvature of the beak, as in the other species of the genus to which it is now referred: but the beak is less curved and less compressed than in the majority of the species, in which respect, as in size and colouring, *P. erythrogenys* makes the nearest approach to it. Colour above olive-brown, a little cinerascens on the head, and a rufous streak commences behind the eye and expands into a patch on the sides of the neck beyond the ear-coverts: lower-parts white, margined with ashy on the sides of the breast; and the flanks wholly ashy, with a tinge of brown: wings and tail a little rufescent, the lower tail-coverts more deeply so. Bill dusky, with more or less of its terminal portion horny-white; and the legs appear to have been greenish. Length ten to eleven inches, of wing four and a quarter, and tail four inches; bill to gape one and three-quarters; and tarse one and a half.

*P. ferruginosus*, nobis. This beautiful species measures about nine inches long, of which the tail is four and a quarter; wing three and a quarter; bill to forehead an inch to one and one-eighth; and tarse an inch and three-eighths. Colour greenish olive-brown above, the

*lurus palustris*, but am informed that it keeps much more to the reeds than seems to be the case with *Cinclorhampus australis*, though it, in like manner, mounts singing into the air.

cap black in the male only ; lores and ear-coverts also black in both sexes, extending a little along the sides of the neck ; a long white supercilium, tinged with rufous on the sides of the forehead in the male ; throat, towards the chin, also white, but the rest of the under-parts bright ferruginous, fading on the belly : bill deep coral-red ; and legs dusky-brown. It is unusual, if not previously unexampled, for the sexes in this genus to present any marked difference of colouring. The species inhabits Darjeeling, and the mountains of Arracan.

Here, then, are two more species of *Pomatorhinus*, to be added to the ten (or eleven) enumerated in *J. A. S.* XIII, 946. I may remark, also, that specimens of *P. schisticeps* from Tipperah and Arracan have the rufous sides considerably brighter than any I have seen from the Himalaya, though this difference may, after all, be merely sexual ; and that there seem to be two marked varieties of *P. erythrogenys*, one having white under-parts with merely faint traces of darker spots, the other with the throat and breast densely mottled with greenish-olive, much as in the darker specimens of *P. ruficollis*, though the latter species has always a white throat.

Genus *Garrulax*, Lesson. A more satisfactory reduction of the described species of this extensive genus may now be offered, than that given in Vol. XII, 948 ; but as there is no occasion for repeating here the synonymes which are there brought together, I shall merely put the word *ante* as a reference to them.

1. *G. Belangeri*, Lesson, *ante*. Tenasserim and Pegu.
2. *G. leucolophos*, (Gm.) : probably *Ianthocincla leucocephala*, Gould, mentioned in *P. Z. S.* 1844, p. 92. Himalaya, Assam, Sylhet, and Arracan.
3. *G. perspicillatus*, (Gmelin), *ante*. China. (*Non vidi.*)
4. *G. chinensis*, (Scopoli) : *G. auritus*, &c., *ante*. China.
5. *G. albogularis*, (Gould), *ante*. Himalaya.
6. *G. gularis*, (McClelland). Assam. (*Non vidi.*)
7. *G. Delesserti*, (Jerdon), *ante*. Neilgheries.
8. *G. pectoralis*, (Gould) : var. *G. melanotis*, nobis, *ante*. Himalaya, Arracan. In the latter province, black-eared and silvery-eared individuals occur commonly in the same flock, with every intermediate grade ; but I have only seen the silvery-eared variety from the Himalaya.
9. *G. moniliger*, (Hodgson). Himalaya, Tipperah, Arracan.
10. *G. McClellandii*, nobis, *ante*. Assam. (*Non vidi.*)

11. *G. cœrulatus*, (Hodgson). Himalaya : not rare at Darjeeling.
12. *G. ruficollis*, (Jardine and Selby): *G. lunaris*, (McClelland),  
*ante*. Darjeeling, Assam, Sylhet.
13. *G. rufifrons*, (Swainson), *Menag.* p. 290 : *G. rubrifrons*, Les-  
son. Java. (*Non vidi.*)
14. *G. ocellatus*, (Vigors). Himalaya.
15. *G. rufogularis*, (Gould), *ante*. Himalaya, Sylhet..
16. *G. squamatus*, (Gould), *ante*. Himalaya.
17. *G. subunicolor*, (Hodgson). Young, described in *J. A. S.* XII,  
note to p. 952, and again in *An. and Mag. N. H.*, May, 1845, p.  
326. The adults are as follow:—Length ten inches, of which the tail  
measures four and a half, its outermost feathers an inch and a half less ;  
of wing three inches and a half ; bill to forehead five-eighths, and to  
gape seven-eighths ; tarse an inch and three-eighths. Upper parts as  
in *G. squamatus*, but slightly greener, the feathers of the crown dashed  
with dusky-cinereous, and but very slightly margined darker ; lores  
blackish ; the ear-coverts and feathers immediately below them a little  
margined with silvery-ash : under-parts nearly resembling those above,  
but the breast and belly paler, with the dark margins to the feathers  
less intense : outer primaries and the emarginated portion of the rest  
narrowly edged with pale ash, the rest broadly with bright yellow, as in  
*G. chrysopterus* and some others : tail aureous olive-green where seen  
above, the remainder of the feathers blackish with narrow white tips :  
bill dusky, and legs brown. Common at Darjeeling.
18. *G. affinis*, (Hodgson). Himalaya.
19. *G. chrysopterus*, (Gould). Himalaya.
20. *G. erythrocephalus*, (Vigors). Himalaya.
21. *G. variegatus*, (Vigors). Himalaya.
22. *G. phœniceus*, (Gould), *ante* : probably *erythropterus*, Hodgson,  
mentioned in XII, 954, note. Himalaya.
23. *G. cachinnans*, (Jerdon), *ante*. Neilgherries.
24. *G. lineatus*, (Vigors) : *Cinclosoma setiferum*, Hodgson ; proba-  
bly *C. striatum* of Royle's list. Himalaya.
25. *G. imbricatus*, nobis. Bootan.

Of the above list, twenty of the species are illustrated by mostly  
very fine specimens in the Society's museum : the desiderata are the  
Neilgherry *G. Delesserti*, the Assamese *G. gularis* and *G. McClel-*

*landii*, the Javanese *G. rufifrons*, and the Chinese *G. perspicillatus*, which last Mr. G. R. Gray identifies with *G. Belangeri*, though I suspect erroneously. In my former synopsis, are included also a *G. Reinwardii* and *G. capistratus*; but the former has proved to inhabit Senegal (vide Swainson's 'Birds of W. Africa', I, 276, *Nat. Libr.*), and the form of this species, which is the type of *Crateropus*, Sw., would appear intermediate to *Garrulax* v. *Ianthocincla*, and *Malacocercus*, Sw., so that *Ianthocincla* appears to have been erroneously identified by Mr. Swainson with his *Crateropus*, and the two groups are recognised separately by Mr. G. R. Gray;—and the latter species, or *G. capistratus* (*Cinclosoma capistratum* of Vigors,) proves also to be the *Sibia nigriceps* of Hodgson, the *Hypsipetes gracilis* of McClelland and Horsfield, and it is in all probability the *Cinclosoma melanocephalum* of Royle's list; wherefore it will now range as *Sibia capistrata*, (Vigors).

It may here be added, also, that *Leiocincla plumosa*, nobis, *J. A. S.* XII, 953, is the *Actinodura Egertonii* of Gould; and that *Cinclosoma* ? *nipalense*, Hodgson, v. *Sibia nipalensis*, H., though allied to *Actinodura*, will not range therein (as has been suggested), but remain as the type of *Ixops*, Hodgson (XII, 958), connecting *Actinodura* with *Sibia*. Accordingly, the four supposed species of the latter genus enumerated in XII, 958, are now reduced to two, from the ejection of the first, and identification of the second and fourth; nor are the two species that remain very closely allied to each other.

The following is a *Crateropodine* genus, allied to *Pellornium*, and bearing some vague resemblance to the *Malacopteron* group.

*Malacocincla*, nobis. Bill as long as the head, rather stout, high, much compressed, the tip of the upper mandible pretty strongly hooked, but indistinctly emarginated, and its ridge obtusely angulated towards the base, the remainder scarcely angulated; gape but little widened, and feebly bristled; nostrils large and subovate, with oval aperture to the front, a little removed from the base of the bill: tarse of mean length and strength, as long as the middle toe with its claw; the claws suited for perching, compressed, and moderately curved, that of the hind toe rather large. Wings moderate, with the first primary reaching to about their middle, the second much shorter than the third, and the fourth longest: tail rather short, weak, and even, except that its outermost feathers are a little shorter than the rest.

Plumage full and lax, the coronal feathers somewhat elongated and of a spatulate form.

*M. Abbotti*, nobis. Length about six inches, or a trifle more; of wing three inches; and tail two and one-eighth: bill to gape not quite an inch, and tarse the same. Colour plain olive-brown above, tinged with rufous on the rump and tail, the upper tail-coverts ferruginous-brown: under-parts paler, the throat and middle of the belly white, the ear-coverts, sides of the breast, and flanks, rufescent, and the lower tail-coverts weak ferruginous. Bill chiefly pale horn coloured; and legs light brown. Discovered by our industrious contributor, Capt. Abbott, in the island of Ramree, Arracan; and since sent by Capt. Phayre from other parts of the same province.

*Alcippe Phayrei*, nobis. This genus is defined, and four species of it described and others indicated, in *J. A. S.* XIII, 384. The present one is most allied to *A. poiocephala*, (Jerdon,) and also to *Siva nipalensis*, Hodgson, of the *Leiotrichane* series: but is distinguished by its much less rufescent hue, especially on the tail and its upper and lower coverts, which are devoid of such a tinge, or the upper tail-coverts retain it only in a very slight degree. Length about five inches and a half, of wing two and three-quarters, and tail two and a half; bill to gape under three-quarters; and tarse seven-eighths of an inch. Upper-parts slightly fulvescent olive-brown, the crown ashy, and wings, particularly the large alars, margined with somewhat deeper fulvescent; lower-parts fulvescent-whitish, whitest on the throat and middle of the belly: bill dusky above, below pale; and legs light-coloured: outermost tail-feather five-sixteenths of an inch shorter than the middle ones. Inhabits Arracan, where discovered by Capt. Phayre.

In naming the two preceding species, I have merely rendered homage due to two gentlemen who have made great efforts to investigate the Natural History of the districts which have been placed under their administration. It is a kind of honour which is in the power of the naturalist to award; but it has been so much and so egregiously abused, that the distinction is no longer a very marked one, such as originally it was intended to be. The evil, however, it is to be hoped, is now working its own cure: and there is reason to believe that naturalists in general begin to feel the impropriety of underrating their

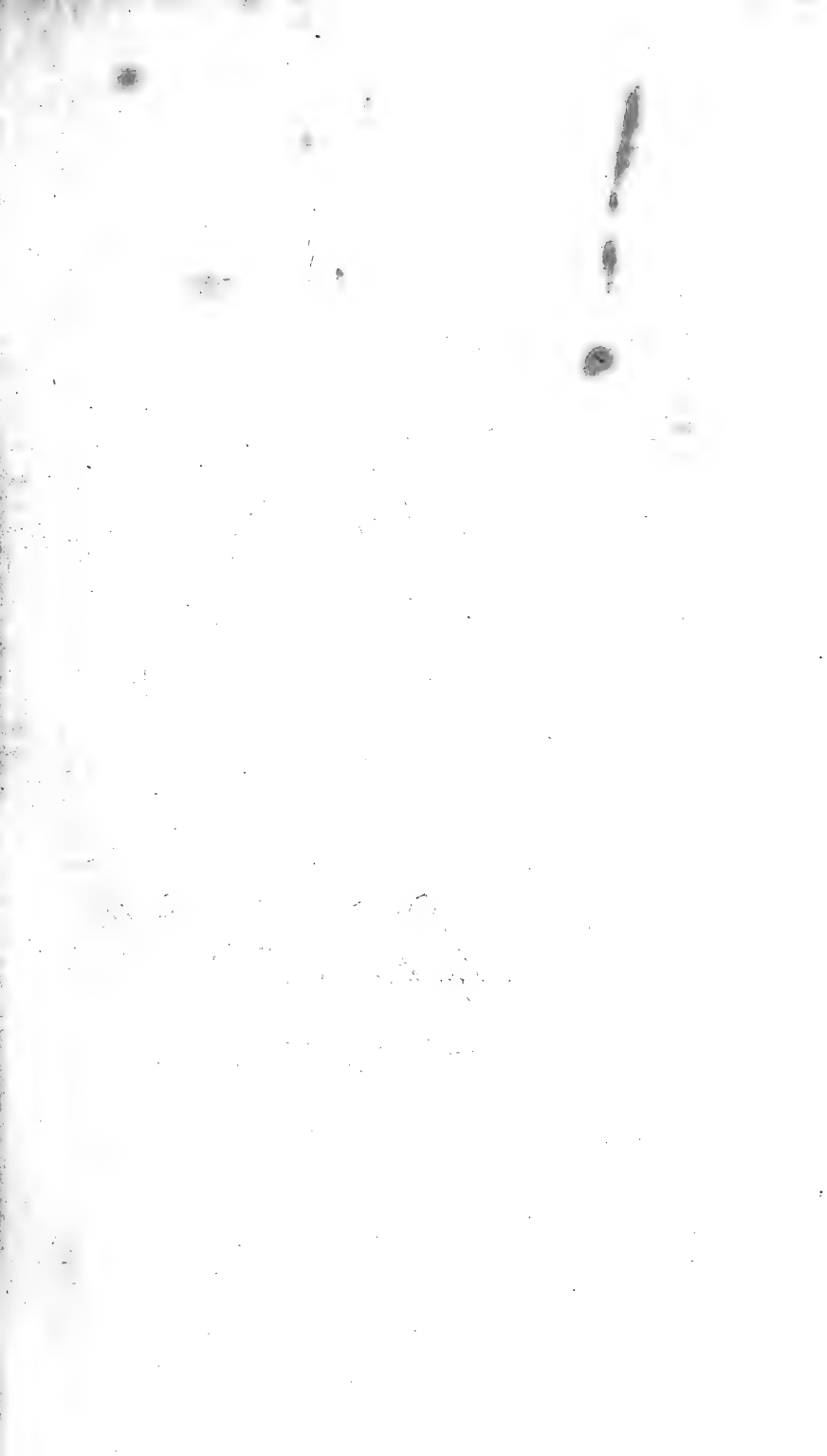
privilege of perpetuating the remembrance of the benefactors of their science, and especially of those who have contributed largely to the stock of materials from which information is derived;—a privilege which assuredly should be exercised charily, and with due judgment and discrimination; such as would really render it an honorable and coveted distinction, and be understood to serve for a lasting memorial and acknowledgment of services that had been done for science.

*Iora*, Horsfield. In *J. A. S.* XIII, 380-1, I indicated three described species of this genus, which had been erroneously considered identical; but at the time of writing that notice, I was acquainted only with the female of *I. scapularis*, which alone is figured and described by Dr. Horsfield. Both this and *I. typhia* are common in the vicinity of the Straits of Malacca—the male *I. scapularis* having the throat and fore-neck dark green, uniform with the upper parts, and no yellow except on the orbital feathers. According to Mr. Strickland, Dr. Horsfield has lately obtained a new *Iora* equal in size to the small *Oriolus xanthonotus*; and Mr. Strickland regards this approximation of size as tending to corroborate his opinion that the genus *Iora* is allied to *Oriolus*,—an opinion to which, however, with all deference, I do not feel disposed to accede. To the synonymes of *I. zeylonica* (which specific name was based on the *Ceylon Blackcap* of Brown's Illustrations,) must be added *Muscicapa melanicter*a, Gm., founded on Brown's *Yellow-breasted Flycatcher*, also from Ceylon.

*Chrysomma*, Hodgson: founded upon *Timalia hypoleuca*, Franklin, v. *T. Horsfieldi*, Jardine and Selby. With reference to Mr. Frith's statement (*J. A. S.* XIII, 360,) of there being a second species of this form in Bengal, differing from the common one in being about half larger, I may remark that *Chr. hypoleucos* is subject to some variation of size, and especially of depth of colouring, more particularly upon the crown; some having this part dusky-vinaceous, with a tinge of the same on the rest of the upper parts, while others have the whole upper parts paler, and of an uniform rufescent-brown, brightest on the wings: the latter, however, appear to be younger birds, and certainly are not different in species from the dark-headed ones. *Chr. hypoleucos* appears to be very generally diffused throughout India.

August, 29th 1845.

( To be continued. )



International Phonetic Alphabet	English Alphabet	English Alphabet	English Alphabet	English Alphabet	English Alphabet	Consonants in the English Alphabet
p	p	t	k	g		a
b	b	d	j			e, i
t	t					o, u
c	a	w				b
q	e	t				k
d						d
n						d, r
l	3	l	n	l		g
r						j, h
s	u	o				y
z						l
m						m
ng	ng	n	t	n		n
						l, r
						p, f
						s
						t
						u, v
						ng

A consonant with a dot above it ends in  
(English ee) thus ē is read be (English  
lee) If the dot is below it ends in o. Thus ō is  
read bo. This sign at the end of a word (")  
signifies n, m, & c<sup>a</sup>.

143 { L. 1728 1729  
D. Agustín Tambon  
+  
= 1728 + 1729, I 1728  
1728 Elena de la Cruz

Fig. 20.  $\text{P.F.} = 0.5$  and  $\text{L.F.} = 0.5$



*A notice of the Alphabets of the PHILIPPINE ISLANDS. Translated from the "INFORME SOBRE EL ESTADO DE LAS ISLAS FILIPINAS," of DON SINIBALDO DE MAS, Madrid January 1843. Vol. I. p. 25. By HENRY PIDDINGTON, Sub-Secretary Asiatic Society, &c. &c. With a plate.*

The Indians were not strangers to the art of reading and writing. I give (fig. 1. of the annexed plate) some Alphabets of different provinces which I have procured. It will be seen, at once, that they have all a common origin, or rather that they are one and the same. The little communication amongst these people for many years or ages, introduced alterations in their caligraphy as in their language, which was also probably at first but one stock.

Father Juan Francisco de San Antonio says, that they write like the Chinese, in perpendicular lines, and this error was copied by Father Martinez Zuniga, M. Le Gentil and others, who have written on the Philippines. Nevertheless, by documents which I have had in my possession, particularly from the archives of the convent of St. Augustin, in Manilla, I have ascertained that it is read from left to right, like our own. In fig. 2, is represented a fragment of a transfer of landed property, written in Bulacan in 1652, on Chinese writing paper :

And in fig. 3, two signatures with their equivalent renderings of the names, in our characters. To this same family of written characters would appear to belong (fig. 4) an inscription cut on a plank, which was found in 1837, by a detachment of Troops, in the mountains inhabited by the savage tribes called Igorrotes.

But withal, no books nor any kind of literature in this character are to be met with, except a few amatory verses written in a highly hyperbolic style, and hardly intelligible. It would appear, that their letters partook of this oriental redundancy.

*Register of Indian and Asiatic Earthquakes for the year 1843. By  
Lieutenant R. BAIRD SMITH, F.G.S., Bengal Engineers.*

1. *Earthquake of the 2nd January, 1843.*—This shock was experienced at Manilla, at a quarter-past one on the morning of the 2nd January. It consisted of two distinct vibrations with a very short interval between them, the first having a duration just perceptible, the second lasting nine seconds. I include in this Register all shocks in localities connected with the great Volcanic band of the Moluccas, because the northern extremity of this band is found in our own Territories, and the whole becomes thus connected with India Proper. The shock under notice appears to have been slight, but it was the forerunner of a series, one of which was of great violence.

2. *Earthquake of the 4th January, 1843.*—This earthquake occurred at Singapore, about midnight of the 4th, and on the same date and about the same hour two shocks were experienced at Malacca. My information relative to these shocks is very limited, being confined to a notice of their occurrence.

3. *Earthquake of the 6th January, 1843.*—The greatest force of the shock of the 6th January, so far as our information extends, was felt at Pulo Nias, in the vicinity of Java and Sumatra. For the following extract from the "Singapore Free Press," detailing the effects of the earthquake, I am indebted to H. Cope, Esq.

*Singapore.* Below will be found an account of an earthquake at Pulo Nias, translated from the "Java Courant," which we have received from our correspondent. It will be observed, that this earthquake occurred about the same time with the shocks which were experienced in Manilla, Singapore and Penang; but that it was of a much more violent nature, and attended with disastrous circumstances, which were happily unknown in other instances. In this case the phenomenon partook of all those fatal and violent effects which have usually been the accompaniments of similar convulsions of the earth in Java and Sumatra.

*Account of an Earthquake at Pulo Nias.*

(Translation from the Java Courant, April 5th, 1843.)

Ignorant of the dismal scenes on which it would rise next morning, the sun set peaceably behind the Goenong (*mountain*) Sie Foli, (Island of Nias) on the evening of the 5th of January last.

At 6 P.M. the Thermometer (Fahrenheit) marked 83°, the sky was clear, the sea calm, the air pleasant and mild, only a breeze from the Westward (a circumstance of rare occurrence in these parts) was felt.

The inhabitants of Nias, not aware of the fate that awaited them, were enjoying the repose of sleep, when at or about midnight they were roused by heavy shocks of the earth, which at first were felt in a slight degree from the wind shifting to the Northward, but became every moment more violent; so that no fixed direction could be given to them, the shocks subsiding into a complete trembling of the earth, so that at every instant it was expected the whole Island would disappear.

The shocks continued without intermission during nine minutes, the ground was moved up and down, like the rocking of a swing; to stand up or to walk was alike impossible; houses were destroyed, burying beneath their ruins the ill-fated inhabitants.

A portion of the Mount Horiffa, close to Goenong Sie Foli, together with the fortifications of the Benteng and the other Government buildings, with the exception of the barracks and Commandant's house, were totally destroyed; Coco and other large trees which for upwards of a century had withstood the hand of Time, were torn up by the roots, and the ground divided itself, shewing deep yawning chasms from which trickled a blackish frothy liquid.

No subterraneous noises were heard, being probably drowned by the dreadful din of falling mountains, houses and trees, joined to the thrilling shouts of the population.

About nine minutes passed in the fear of immediate destruction, the inhabitants began gradually to recover from the trance in which they lay plunged by this sudden calamity, people appearing from beneath the ruins of a house, or from an abyss into which they had been plunged; the one to save an aged mother, the other his helpless child.

The dreadful scene was lit up by the most beautiful sky and sparkling stars. Not long the unfortunate Islanders were permitted to exult in the hope of their miraculous escape. Again, the earth began to tremble, and repeated shocks were felt with new force. Suddenly a tremendous wave rose from the South-East, and with awful noise, spreading itself over that part of the Coast, bore every thing before it, sweeping away men, women, cattle, houses, and even whole villages;

so that in a single moment, the same spot where cattle were grazing, had become the abode of fishes.

The large Campong Mego, about one Dutch mile, South of Goenong Sie Foli, was entirely washed away by the wave; and many days afterwards the dead bodies of the victims of this woeful destruction might be seen on the beach.

The same wave penetrated into the neighbourhood of Goenong Sie Foli with such violence, that the prows lying in the river were thrown upon the shore, 100 or 160 paces from their anchorage; among the number was the Government Cruising Schooner, No. 23. The new Bazar, consisting of wooden houses, and situated on the left side of the river, was also entirely washed away. The inhabitants who escaped fled to the Benting, 60 or 100 feet above the sea, to implore the succour of others as miserable as themselves.

This phenomenon continued until half-past four in the morning, the shock being felt at intervals of two minutes, when another earthquake was experienced, which was more violent than the first one, and continued for about six minutes. The shock generally came from the West, going to the North, changing however directly to the South. The trembling of the ground, although more slightly, was felt for several days afterwards.

The authorities here have immediately caused the necessary measures to be taken, and despatched a Government vessel to give assistance to the unfortunate inhabitants of the island of Nias.—D. F. S.

*Padang, 23rd March, 1843.*

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Pulo Nias, the seat of the catastrophe just detailed, is a small island off the West Coast of Sumatra, in about 2° N. Lat. and 98° E. Long. The intensity of the Earthquake, however great in Pulo Nias, would appear to have diminished much at a short distance from it, since no notice of its effects on the adjoining coast of Sumatra is given, and from the silence of the writer of the above account, we are led to infer that the shock if felt at all at Padang, was there very slight.

Pursuing a North Easterly direction, this same Earthquake was experienced at Singapore and Penang. The following extract from the "Penang Gazette," details the effects of the shock at these two places.

“ We noticed in our paper of the 7th instant, that a shock of an Earthquake had been experienced here about half-past 12 on the morning of the 6th, and we observe from the “Singapore Free Press” of the 12th, that a shock had been felt there precisely at the same time. In both places it was very slight, but here more generally, and on the hill at least, more severely felt than at Singapore. It is rather remarkable that on the 8th, when we had a repetition of the Earthquake about 2½ P. M. the shocks on that occasion were also more distinctly felt on the hills than in the valley. The oscillations were in both places of very short duration, and in Penang, as far as we can learn, the direction was from South to North or the contrary, but at Singapore it is stated to have been from East to West. For some time preceding this subterraneous commotion, the weather at Singapore had been unusually dry and hot for the season, the atmosphere clear, and the wind from the North East, and nothing indicated a change, until half an hour before the shock, when the heavens became ‘quite black and chilly.’ Here also it was preceded by the same kind of weather, which however is usual with us at this season, but no sudden change or phenomenon of any kind was noticed immediately to precede the shock, excepting that, as we have learned, the rats in a house in town were heard to be particularly noisy and riotous about the roof. In both places, however, a marked change followed the convulsion. At Singapore, at 7 A. M. the following morning, heavy rains set in, and continued unremittingly for eleven days; and in Penang we experienced for several successive days sudden gusts of wind interrupted by calms, and in the evening squalls from the N. and N. E. with heavy clouds, rain and thunder in these directions, no rain however fell upon the Island, excepting a short partial shower on the 15th, and the weather has again resumed its dryness and clearness. At this time not a blade of grass is to be seen, and vegetation of every description is suffering excepting where water is applied.

“ Shocks of Earthquakes have on several occasions been felt at Penang; within the last ten years we have had four different shocks, and with the exception of the last, they have always happened during the latter months of the year. The first took place in November 1833, the second in August 1835, the third in September 1837, and the fourth on the 6th instant, as above stated. It appears therefore that here they occur periodically, and that the last interval has been more than double

the usual length. Of these, the shock in September 1837, was, by all accounts, the most severe, and the oscillations, as in the present case, are said to have come from South to North, and to have lasted full a minute and a half. It is said that on that occasion, several herds of cattle in the neighbourhood were observed running in the utmost confusion in all directions, that lamp and picture-frames oscillated, that the Roman Catholic Church bell rang of its own accord, that quantities of large shot piled up in the Fort were thrown down and scattered about, that a stone wall of a substantial building in town was rent, and the whole inhabitants were thrown into a state of consternation. The shipping in the harbour did not experience this shock, nor did the sea appear agitated; five days subsequently however another smart shock was felt, and was followed by a very heavy squall from the N. W. and great agitation and rise of the sea in the harbour. The tide overflowed the Northern beach, and flooded the compounds and lower rooms of the houses in the neighbourhood. The convulsion was experienced at the same time at Achen and along the Pedier Coast, and it is said that these places sustained considerable damage. By the late shock a clock in town was stopped, and some felt a dizziness in the head and a sensation like sea-sickness, but we have not heard of any other phenomenon attending this Earthquake. It may be that neither this shock nor any of the previous ones we have noticed are to be supposed the effects of convulsions taking place immediately below us, but to have been transmitted from some neighbouring region within the range of Earthquakes, such as Sumatra. The recent one may be described as having been a mere tremor of the ground, more than a shock."—*Penang Gazette*, 28th January, 1843.

From the facts now detailed, it appears, that the point of greatest intensity of the shock of the 6th January 1843, was in the immediate vicinity of, if not directly beneath, the island of Pulo Nias. The south coast of the island suffered most, since it was upon it that the destructive wave first broke. The facts stated are not sufficient to warrant any conclusion as to the cause of this great wave; it may have arisen from violent volcanic action in the adjoining bed of the sea, or it may have been the reflux of a wave generated by the sudden upheavement of the coast of the island itself. In both cases it is probable, the sea would first have receded from, and then returned in force upon the coast, and in the latter part of the upheavement would have remained, but no

indication of any such phenomena are given, and the point must remain an undecided one.

The general direction of the shock was from South-West to North-East; from the relative geographical positions of Pulo Nias and Singapore, the direction in the latter island would be from West to East, just the contrary to that specified in the extract above given; in Penang, on the other hand, the course would be from South to North, as correctly stated by the writer in the "Penang Gazette."

Indications of atmospheric disturbance accompanied the shock at Singapore and Penang, and most probably at Pulo Nias also, although it is not so stated in the published notices. At Singapore, nearer to the focus of the shock, these disturbances were greater than at Penang, and it is a fact to be noted, that at the former place, very heavy rain immediately followed the convulsion.

4. *Earthquake of the 8th January, 1843.*—This shock, which was very slight, was experienced at Penang, about midnight of the 8th January. It was not accompanied by any phenomena requiring special record, and was the last of the series which in the early part of the month of January were experienced throughout the Eastern islands.

5. *Earthquake of the 8th February, 1843.*—This shock was experienced at Ahmedabad in Goojerat, at 2 A.M. on the 8th February. The direction was from N. E. to S. W., and four distinct vibrations of the earth were observed, the entire duration being about eight minutes. Before the shocks were felt, there was a great rumbling noise as if carts or carriages were passing by.

These shocks were evidently of slight intensity and limited range, there being no notices of their having been experienced elsewhere than in the neighbourhood of Ahmedabad. So far as inference may be made from their direction, they would seem to have emanated from the tract of the Vindayas.

The early part of the month of February 1843, was remarkable for other indications of volcanic activity. On the 6th, one of the small volcanic hills on the Arracan coast, near to the station of Kyouk Phoo, exhibited a sudden eruption; some particulars of which are given in the following extract from a letter to the address of H. Piddington, Esq., kindly forwarded to me by that gentleman.

“ *Kyook Phyoo, 7th February, 1843.*

“ We however had last night a most magnificent volcanic eruption. The mountain, which is of moderate height and shaped somewhat like a pyramid, is about three or four miles from the station, which was rendered as light as noonday, although it was midnight at the time. The eruption commenced at about 11 P.M., unaccompanied by any rumbling, but throwing up masses and particles of lava to an immense height, and presenting a most magnificent spectacle, visible all round the country. The weather had been for some evenings previous, close and threatening, although the glass kept up, varying from 30-12 to 29-98 for the last five or six days. The fires gradually went out, and all was still again by about half an hour after midnight. This eruption takes place from what I hear, generally once in two years, sometimes annually.”

6. *Earthquake of the 1st April, 1843.*—The Earthquake of the 1st April 1843, was experienced in the Deccan ; I shall trace its course so far as the materials available permit, from North to South.

The most northerly point at which the shock was experienced was Sholapore ; (Lat.  $17^{\circ}40'$  North and Long.  $76^{\circ}3'$  East) the effects of the Earthquake at this place are detailed in the following extract from the “ *Bombay Times.*”

“ The following extract from a letter, dated Sholapore, 1st April 1843, gives an account of an Earthquake which seems to have visited the Deccan.

“ I was suddenly awakened this morning about half-past 4, by a loud rumbling noise very like thunder, only more continuous and monotonous ; and while speculating on what the possible cause could be, my bed began to shake in a very unequivocal manner, so as to leave no doubt of an Earthquake ; the noise apparently came from the South or South-West, preceding the shock and lasting about two minutes, and the shock, which though slightly felt in a tent, was more severely apparent in houses, and continued, I should think, about two seconds, perhaps hardly so much. I hear however, that in the town at the foot of the hill of Sholapore, the shock was much more severe, that the ground rocked considerably, and plaster fell from the roofs and walls of the houses causing infinite alarm to the people, such an event never having occurred here before within the memory of any one. One of my Tappal (post) runners informs me, that the noise and shock met him about six miles



North-East of this, and that the ground rocked so much that he ran to a date tree for support ; but this moving also, he threw himself on the ground, and did not venture to move till all was over. I suppose the course of the Earthquake therefore to have been nearly South-West and North-East ; and if you hear more of its beginning and ending, this may serve to give you some idea of its course ; of the breadth of its influence I have of course no idea. All yesterday was remarkably sultry and oppressive, nor was there a breath of air all night, a very unusual thing here. What between the earthquake and comet, the people here are much perplexed, and wise Brahmins are prophesying wars, tumults, and famines, to the terror of the lieges.

“An old gentleman who has just called, informs me, there was an Earthquake here, the year Tippoo was disposed of ! I have no means of ascertaining the truth of this ; but is this country in the track of any volcanic current or influence ? Certainly Earthquakes are not common occurrences.”

The next place from which we have a notice of the shock, is Mucktul (Lat.  $16^{\circ} 43'$  N. Long.  $77^{\circ} 35'$  East). This notice is contained in the following extract from the “*Madras Spectator*” of the 26th April, 1843.

“A correspondent at Mucktul has favoured us with the following notice of the shock of an Earthquake felt there, as at Bellary and Sholapore on the 1st of this month. We apprehended with our correspondent, that the maximum intensity of the shock passed through Bellary in a line parallel to the direction of the Western Ghauts, its violence subsiding further Eastward, as at Mucktul.

“The Earthquake was felt here very distinctly on the morning of the 1st about a quarter to 5 o'clock. The undulating motion was not sufficiently perceptible to enable one to judge of the direction of the shock ; here was merely a slight tremulous motion accompanied by a rumbling noise similar to that of a carriage passing a drawbridge. I suspect from your remark in your paper of the 12th instant, that its maximum point of intensity was at Bellary, or between this and Bellary. At Singsoorgoor and Shorapore, both places nearer Bellary than this is, it was felt much stronger than here ; but at Hyderabad, about one hundred miles from this station, I suspect there was no shock, otherwise I should have heard ; Bellary is also about one hundred miles from Mucktul. The morning of the 1st was here also excessively hot and close.”

Our next notice of the shock is from Bellary (Lat.  $15^{\circ} 5' N.$  Long.  $76^{\circ} 59' East$ ), where the following phenomena were observed, and are detailed in the "*Madras Spectator*:"—"We are indebted to a friend at Bellary for notice of the shock of an Earthquake which was felt there on the 1st instant, at about a quarter before 5. That morning a rumbling noise was heard described as resembling the well known sound (to railway travellers) of blowing off the steam from the engine. The sound increased in loudness to that of a moderate peal of thunder, and with it an undulating motion was felt, which increased in intensity till the whole cantonment shook. 'My bed,' says the writer, 'trembled till I felt almost giddy; the sound then decreased, and with it the agitation subsided.' The direction of the shock appeared to be from South-East to North-West, the atmosphere seems to have sympathised with this subterranean disturbance, the previous night having been a very stormy one, and at 4 on Saturday morning it suddenly became oppressively hot and still."

I am indebted to H. Piddington, Esq. for the following interesting notice by Captain Newbold, Madras Army, of the effects of the shock of the 1st April 1843, at Kurnool. This notice ought to have preceded that from Bellary, but it was accidentally omitted.

*"Kurnool, 23rd February, 1844.*

"Observing from the pages of your Journal that some researches are being instituted into the phenomena of Earthquakes, the following extract from my memoranda of an Earthquake that was felt here last year, may add to the recorded data on this head.

"Kurnool, Long.  $78^{\circ} 7'$  Lat. N.  $15^{\circ} 50'$ : approximate height above the sea 900 feet. April 1st 1843, about 5 A.M. awakened by the shock of an Earthquake, accompanied by a subterranean noise like that of the rumble of Artillery at a distance. It lasted only some seconds; the noise appeared to come from the North-East, and died away to the S. W. It appears to have been felt at Bellary, which is about seventy-three miles direct distance W. S. W. from Kurnool, about the same time. There was nothing particular in the state of the weather. The comet which I first observed here on the 4th of the preceding month, was then visible, and its advent had been accompanied by a sudden and unusual rise of the Tumbuddra, which had swept off the numerous native gardens in its bed, a catastrophe which both the Affghans and Hindoos of this

place concurred in attributing to the inauspicious influence of the 'Tailed Star.'

"Some of the older natives of this part of India assure me, that Earthquakes usually happen in the hot season. East of this in the Jemaconda district, separated from Kurnool by a high chain of the Eastern Ghauts, slight shocks of Earthquakes are more frequent than in other parts of South India. This district is situated on the plutonic, hypogene, and basaltic rocks which form a platform between the trap of the Deccan—the largest known continuous sheet of ancient lava in the world—and the great active volcanic band that runs Southerly down the Bay of Bengal, crosses the Equator by Sumatra into the Eastern Archipelago, thence Easterly embracing Flores, Java, and Timor, and the whole chain of the islands to New Guinea: whence the main trunk proceeds Northerly by the Moluccas and Philippine Islands, terminating to the North in the Peninsula of Alaska, in about the 59th degree of longitude.

"Kurnool is situate about 76 miles in a direct line W. by S. from Jemaconda, on the great line of drainage of this part of India, at the confluence of the Tumbuddra and the Hendri, on the limestone associated with the diamond sandstone, which here overlie the plutonic rocks previously alluded to; the latter constitute the base of the whole of Southern India, and are seen outcropping immediately in the vicinity of Kurnool.

"The most Southerly point to which the shock under notice would appear to have reached, is Hurryhur, Lat.  $14^{\circ} 30'$  N. Long.  $75^{\circ} 59'$  East. The following is the account of the shock as felt at that place. April 2nd. A slight shock of an Earthquake was felt here a little after 4 o'clock yesterday morning, attended by a dull noise, as if it were the rolling of a carriage at a distance.

"It was predicted the day previous by the Bramins, that a phenomenon resembling a blazing man with a sword in his hand would be observed the same night in the heavens, and numerous have been the spectators anxiously expecting its appearance the greater part of the night; but for all their trouble (although many were up till 4 A. M.) they were disappointed.

"The weather previous to the above shock had been exceedingly warm, but since we have had a few showers of rain, and it is now cooler."

From the preceding details, the ascertained limits of the shock of the 1st April are Sholapore on the North and West, Kurnool on the East,

and Hurryhur on the South. The intensity would appear to have been greater at the intermediate point, Bellary, than at any other, leading to the inference that this place was nearer to the focus of the shock than the other stations at which observations were made. The general direction of the shock was evidently parallel to that of the Western Ghauts, namely from South-West to North-East. A peculiar state of the atmosphere was observed at four of the five stations where the shock was felt; an oppressive closeness of the air and great heat preceded the shock, and after it passed, a change was experienced at Hurryhur by rain.

*Earthquake of the 6th April, 1843.*—This shock was experienced in various parts of Assam. The following extracts give details :

Extract from the "Friend of India :"—"A letter from Sibsagur, dated April 7th, says, a very singular meteoric appearance was observed here a few evenings since. It occurred a little before 9 o'clock on the evening of the 4th; a very brilliant light suddenly illuminated the whole atmosphere, and on looking up a large cluster of falling stars was seen rapidly descending towards the East in an oblique direction. These disappeared in a few seconds, and about a minute afterwards a loud report was heard resembling that of cannon, resulting doubtless from explosion of the luminous mass. The report was also heard at Jaipore. Last evening at half-past 8, we had several very severe shocks of an Earthquake; the vibrations lasted for about five minutes. Another slight shock was felt at a quarter-past 1 o'clock this morning."

The following extract from Captain Hannay's Journal, kindly communicated to me by Mr. Piddington, gives an account of the shocks as experienced at Debrooghur :—"After a very hot day and close sultry evening, a severe shock of an Earthquake at Debrooghur, lasted several minutes. The motion, however, was only trembling; affecting those houses which had posts built up by walls. Direction appeared to be from W. to S. W.

"*April 7th.*—Slight shocks at Debrooghur at midnight. Both these Earthquakes felt at Sibsagur, Jeypore, and all over Upper Assam."

At Jeypore the shock is thus described, under date *7th April* :

"Last night, nine or ten minutes past 8, we felt a smart shock of an Earthquake, and in four or five minutes more, another shock more severe than the first, and which lasted, I should think, full two minutes. The

doors and windows rattled at a great rate, and one of our lads, who was standing on the bank of the river at the time, said he was near being thrown into the stream: it was the most severe shock I ever felt in Assam. Its course appeared to be from East to West; some of the residents think there were three shocks, but I only noticed two. The weather has been unusually warm for the last two or three days.—*Hurkaru Paper.*

8. *Earthquake of the 11th April, 1843.*—This shock was felt very smartly at Landour, and occurred about five minutes past 8 A.M. The doors and windows of the houses shook and rattled loudly. From observations made on the undulations of liquid in a cup, the direction was from North to South, or from the interior of the hills towards the plains; the duration of the shock was estimated at thirty seconds.

The same shock was experienced about the same time at Hurdwar and Meerut, at both places being very slight, and unaccompanied by any circumstances worthy of note.

9. *Earthquake of the 12th May, 1843.*—The following is an account of this shock as experienced at Penang, taken from the “Penang Gazette” of May 13th:—“Yesterday about 1 P.M. an Earthquake was felt here; the motion was very distinct, it was like a succession of waves, and very different from the quick vibration of the shock experienced in January last: after the first two or three waves a slight pause, when it continued, the undulation being greater; persons sitting were moved from side to side or backwards and forwards in their chairs in a direction from West to East, or from N. W. to S. E., and hanging lamps were swayed to and fro in the same line. It lasted five or six seconds. It came in the direction of Sumatra.”

We have no account of this shock from any other point than Penang.

10. *Earthquake of the 3rd of June, 1843.*—This shock was also of very limited range and slight intensity; the only place where it would seem to have been felt being Titalayah, at the base of the Sikkim hills, on the road to Darjeeling. The following extracts from the “Hurkaru” newspaper furnish details.

“By a letter, which we have just received from Titalayah, it appears that that place was visited by an Earthquake on the morning of the 3rd instant. A smart shock of an Earthquake was felt here this morning; I could not note the precise time, not having any time-piece, but I think it was about 10 o'clock. It appeared to pass from North

to South-West, and lasted about three seconds, accompanied with a rumbling noise, like distant thunder.

“The weather for the last three days has been very sultry, with great masses of heavy dark clouds in the North: but this morning about 7 o'clock a thunder-storm passed from North to South-East, with heavy rain, continuing for upwards of two hours; it was perfectly calm at the time of the shock, but the wind rose immediately afterwards, blowing in sudden and heavy gusts from the North-East, with distant thunder from the Westward.

“No damage has been done that I am aware of, but the natives were much alarmed; some, who were at work on the road before my house, threw down their tools and ran away.”—*Bengal Hurkaru*, 10th June.

11. 12. 13. *Earthquakes of the 15th, 16th and 17th June, 1843.*—This series of shocks was experienced in Assam. The first, that of the 15th, is thus noted in Captain Hannay's Register—“At 11 A.M. a smart shock of an Earthquake, with a vertical motion.”

The second, that of the 16th, is thus described in a letter from Jeypur: “On the 16th, fifteen minutes past 8 P.M. we felt the most severe shock of an Earthquake I have noticed in Assam; we had a slight shock the day previous at noon.” Mr. Masters, in a list of Earthquakes felt in Assam, forwarded to me by Major Jenkins, the Commissioner, to whom I am indebted for many similar acts of kindness, thus notices the same shock—“At 8h. 45m. P.M. a smart shock at —.”

The last of the series is described in Captain Hannay's Register in the following terms:—“June 17th, 8 P.M. a very smart shock; at first slight and followed by a severe one, motion undulating, and from the position of a clock which was stopped, must have come from S. W. or W. It lasted altogether about a minute; the weather rainy, with occasional light squalls from S. W. These shocks were felt at Delava, Jaipur, and Sacherah; that of this date at a few minutes past 8, reported by the Officer at Sacherah to have thrown down a portion of the bank of the Burumpooter.”

14. *Earthquake of the 17th June, 1843.*—This shock is of interest, as being the only instance of an Earthquake in Ceylon of which any notice has been obtained; reference is made in one of the extracts that follow to a shock in 1823, that affected this Island, and these two cases are all that have as yet been found on record.

The following extract from the “Colombo Observer” of the 19th

June, details the effects of the shock as experienced at Colombo :—" On Saturday morning, at about half-past 12, a slight shock of an Earthquake, which lasted half a minute, was felt at Colombo.

"Persons who happened not to have gone to bed felt the ground to tremble, and heard furniture and even roofs of houses to crack. Many amusing anecdotes are told of those who were awoke by the shock ; some supposing tricks were being played upon them, others that robbers were in their houses, and several that people were under their beds."

The "Ceylon Herald" of the 20th, gives the following particulars :

"On Friday night, the 17th, at about half-past 12, Colombo and its vicinity were visited by an Earthquake, the most terrific of all natural phenomena. It was however so slight, that many people were not at all aware of it, and what was worse, they would hardly believe it when they were informed.

"Three distinct shocks were felt at very short intervals, all three not perhaps so long as a minute ; great numbers were aware of two shocks, and all agree that the last was the smallest. Most people having retired for the night, they were awakened by their beds being moved upwards in a most remarkable manner, while the curtains moved backwards and forwards, doors and windows shook, and occasionally a creak was heard from the rafters and crockery in the godowns ; but although fears were entertained that injury was done to the houses, not a single instance of the kind has been brought under notice.

"The officer on guard felt the guard-room vibrate ; and in another quarter of Colombo a gentleman writes, that his whole house moved the same as a ship when struck by a heavy sea.

"From Galle we learn, that it was felt there at the same time, and with no greater force. As yet we have heard nothing of its being felt in the Central Province. It is very rarely that Earthquakes happen either in Ceylon or Southern India ; we have heard of one in 1823, which at Hambantotte caused the glass on the sideboard to jingle, and it was pretty generally felt throughout the Island.

"It frequently happens, that an extraordinary fall of the Barometer is observed to precede an Earthquake, but we have not heard yet whether this symptom of its approach was noticed here or not ; such a fall of the Barometer lately attracted considerable attention on the Coast, in connexion with the late storms, and it will be curious to know whether it

was observed on this occasion. Not long after the Earthquake, we had one of those violent squalls which have been so frequent of late as to pass almost without observation ; but we have been assured by some of the oldest residents here, that for many years past there have not been such violent storms of wind and rain. As if the electricity in the earth and atmosphere, or whatever else causes storms and Earthquakes, were exhausted, we have had since Saturday a sudden transition to settled weather, with every appearance of its lasting for some time."

With the exception of its locality, there is nothing requiring note in this shock.

15. *Earthquake of the 10th August, 1843.*—Two notices of this shock has reached me ; one from A. Campbell, Esq. at Darjeeling, the other from E. Ravenshaw, Esq. at Patna. Dr. Campbell writes as follows, under date 11th August, 1843.

"At 15 minutes to 5 p. m. yesterday, 10th August, by my watch, which was 15 minutes fast by sundial time, we had a shock of Earthquake here, which lasted 20 seconds. Its course was N. W. by S. E. The motion was horizontal : no damage done to any thing.

"As you have expressed a wish to be furnished with information regarding Earthquakes, I have the pleasure to inform you, that a slight shock was experienced at Patna on the 10th instant, at about 4½ p. m. A letter from Tirhoot (Muzufferpoor) mentions, that it was also felt there on the same date and about the same hour."

In a very interesting letter, under date the 9th September 1843, Mr. Ravenshaw communicates the following information :—"A few days after I wrote to you about the Earthquake of the 10th August, my Sheristadar told me he had heard springs of water (Bumbâs) had suddenly made their appearance in several villages of the district. I immediately told him to send a man to the spot to bring me some of the water, and all the particulars he could collect regarding the date of their appearance ; their number, site, &c. The man returned with seven bottles of the water, and a note in Persian from a person on the spot, stating seven Bumbâs had appeared at Dostmahomedpoor, Purgunnah Azemabad, about twenty miles East of Patna. Of these two were large and flowing rapidly, and five small ; about a koss West of the village there were seven or eight more, of which three were constantly flowing, the others smaller and less active. He said that others had been heard of at Moza Tilwur, Purgunnah Bhum-



poor, and at Jugutpoor Chedee, Purgunnah Gyaspoor, to the Eastward of Dostmahommedpoor. Another native told me he had heard of a similar occurrence at Moza Soojava, near Jehanabad, half way between this and Agra; some of them are said to be hot springs. I tasted some of the water with oxybate of ammonia, and it proved to be strongly impregnated with lime, like all the water of this district. The Persian letter reported that the Bumbâs made their appearance, or rather were first observed, on the 13th Sawun, or Monday 24th July, which is 16 days before the Earthquake; but I think this must be a mistake, as they were not mentioned to me until several days after I had written to you: it is possible however there may have been another Earthquake, which was not felt at Patna. At any rate I have thought it right to send you this information, which, if not useful, may be interesting.

“Any connection between the appearance of these Springs and the Earthquake is doubtful, the evidence being against, rather than in favour, of such connection; at the same time the occurrence is rare and interesting, and deserves to be recorded, although its causes are too obscure to be traced satisfactorily.

16. 17. *Earthquake of the 3rd September, 1843.*—These shocks were felt in Assam, and are recorded by Captain Hannay, in whose memorandum the following remarks occur under the above date:—“After a hot and sultry day (the 2nd) as ever I felt, the clouds gathered to the South-West, indicating rain, but passed off without any; night very close and sultry: awoke by a smart shock of an Earthquake, cannot speak as to direction.” Again, under the same date, at 7½ P. M. it is remarked, “After a very hot day clouds gathered at S. E., very close and sultry. Squall came on a little before sunset; vivid lightning all round the heavens: previous to squall breaking heard an extraordinary noise in the heavens overhead, like the falling of heavy rain on distant jungle, or like the rushing of wind through a funnel: with the noise was heard an occasional growl, like distant thunder. When the rain fell, this noise had continued for some time, thunder very high in the heaven, but the lightning one blaze all round; whilst at dinner a smart shock from the South.” This latter shock is interesting, from being preceded by the peculiar noise in the air, and accompanied by an excessive display of electricity in the atmosphere. Both shocks, in common indeed with all experienced in Assam, were slight in intensity.

18. *Earthquake of the 30th October, 1843.*—This Earthquake occurred at Sandoway in Arracan, and is thus described under date 31st October 1843, by a correspondent of the “Englishman :”—“Yesterday morning, at a quarter to 8 o’clock, this place was visited with a severe concussion of an Earthquake, which continued about two minutes; the oscillations appeared to take a North and Southerly direction, no injury was done, and the general face of the surrounding country remains unaltered: the morning was exceedingly fine, and the Thermometer at 75°. I have written to friends at all stations North of this, to ascertain whether the shock was felt at those places, and have also got natives to write to their friends, in the hills and towards Bassein, to learn whether it was felt in these directions, and if it presented any uncommon phenomenon.”

At a subsequent date, the same writer adds the following particulars :—“Having promised you the results of my enquiries connected with the Earthquake which was felt here on the 30th October last, and with the volcanic eruption which took place some time ago off that Island, near Cheduba, I have now the pleasure to forward you all the information I have been able to collect on the subject, premising, however, that being totally unacquainted with the science of geology, many minutiae have doubtless escaped my enquiry, which would have attracted the attention of a scientific man.

“Regarding the Earthquake, it appears to have proceeded from the South, extending itself along the line of coast as far North as the Town of Ramree, at which place it was but slightly felt; and still fainter at Kyook Phyoo, which is situated at the North of Ramree Island. The shock was very perceptible at Cheduba, scarcely at all so in the Yoomadong mountains, but very severe at ‘Gookhcomg,’ which is about ninety miles South of this, and on the sea shore. The Soogree (or head man) of that district, with whom I have fortunately had an interview, describes it as having so agitated the place, as to cause a great rustling in the trees, and loose stones to roll down the hills; but he states he has neither seen nor heard of its having been attended with any remarkable incident. It has in all probability been felt in Moulmein, and if you have not already had some information on the subject from thence, it would perhaps be a point worth ascertaining.\*

\* No notice of this, &c. &c.

“ With reference to the Volcano, which left a transient Island formation, it took place in July last, and continued in an igneous state for eight days. The water in the wells on Flat Island rose considerably, and no noise or agitation preceded the eruption, or was experienced during the period of its action. The native from whom I gained my information, describes it as having been a most magnificent sight, particularly at night; flaming forth with fierceness, as to cause the columns of smoke to ascend till lost in the heavens. The Island which is mentioned as having been thrown up out of the sea, and subsequently disappeared, could have been nothing more than an accumulation of ashes, cinders and lava, ultimately removed by the influence of the tide, and the severity of the South-West monsoon. The situation of it appears to have been a little South of Flat Island, in the intersection of two lines, one drawn through the two volcanoes in Cheduba, and the other through the volcano near Kyook Phyoo and Flat Island; this leads one to the supposition, that it might have some relation to the two former volcanoes. I have seen a number of geological specimens, which were subsequently brought from Flat Island, among which I could recognise quartz, limestone, iron pyrites, shale and scorïæ, besides some others of an igneous nature, the minerological composition of which I could not ascertain.”

19. *Earthquake of the 14th November, 1843.*—The following extract of a letter, under date the 25th November 1843, from Major Jenkins, gives an account of a shock on the 14th November, as felt in parts of Assam:—“ This is just to mention, that a smart shock of an Earthquake was felt at Gowhattee and through Kamroop on the morning of the 14th instant, about from 1 to 3 o'clock; it was so severe as to awaken all the gentlemen out of their beds.

“ I did not feel it in my boat, nor did any of the gentlemen at Sib-sagur (Rungpoore) feel it. Mr. Masters now with me, among others, neither felt it, nor heard that the natives had perceived it.”

As far as Assam is concerned, it has been partial it would seem, as no intelligence of this shock having been experienced elsewhere than above stated having reached me, Major Jenkins's reference as to its local character is probably correct.

20. *Earthquake of the 18th December, 1843.*—This shock was also confined, so far as collected intelligence would shew, to lower Assam. The following extract of a letter from Captain Butler to Major Jenkins,

kindly forwarded to me by the latter, gives details :—" Gowhattee, 19th December 1843. Yesterday whilst sitting in Court, at twenty minutes past 4 P. M. we felt a very severe Earthquake, with a rumbling noise from South to North: the motion was very great, and had it continued a moment longer, I was prepared to rush out of the building. These Earthquakes appear to becoming more violent than I ever recollect before in Assam, from what cause I cannot imagine; but a little more would bring down our Courts and large Bungalows." Major Jenkins mentions, that this shock was not felt in Upper Assam, nor is there any reason to believe it was felt towards Sylhet and Bengal; so that, if the Earthquakes are really becoming more severe, they would appear still to preserve their strictly local and limited character.

This concludes the Register for 1843, shewing a total of twenty shocks during the year, of varying intensity and character. I refrain at present from attempting any detailed arrangement of the phenomena they present, as this can best be done when a large number of observations come under discussion. I now, in closing this paper, will merely annex a Summary of its contents in a Tabular Form.

*Tabular Summary of Indian and Asiatic Earthquakes for the year 1843.*

Number.	Date.	Locality affected.	Remarks.
1	January 2d,	Manilla, . . . . .	Slight.
2	" 4th,	Singapore, . . .	Slight. [Singapore, &c.
3	" 6th,	Pulo Nias, . . . .	Very severe, extended to Penang,
4	" 8th,	Penang, . . . . .	Slight.
5	Feb. 8th, ..	Ahmedabad, . . .	Slight. [&c.
6	April 1st, ..	The Deccan, . . .	Severe, felt at Sholapore, Belgaum,
7	" 6th, ..	Assam, . . . . .	Smart.
8	" 11th, ..	Himalayas, . . . .	Smart, extended to the Plains.
9	May 12th, ..	Penang, . . . . .	Smart.
10	June 3d, ..	Titalayah, . . . .	Slight.
11	" 15th, ..	Assam, . . . . .	Smart.
12	" 16th, ..	Ditto, . . . . .	Severe.
13	" 17th, ..	Ditto, . . . . .	Smart.
14	" 17th, ..	Ceylon, . . . . .	Smart.
15	Aug. 10th, ..	Darjeeling, . . . .	Slight, extended to Patna, &c.
16	Sept. 3d, ..	Assam, . . . . .	Smart.
17	" 3d, ..	Ditto, . . . . .	Ditto.
18	Oct. 30th, ..	Arracan, . . . . .	Smart.
19	Nov. 14th, ..	Assam, . . . . .	Slight.
20	Dec. 18th, ..	Ditto, . . . . .	Smart.

# JOURNAL

OF THE

## ASIATIC SOCIETY.

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*On the Buddhist Emblem of Architecture. By Capt. T. LATTER, B. N. I.,  
Assistant Commissioner, Arracan. With two plates.*

MY DEAR SIR,—I do myself the pleasure of forwarding, for the inspection of the Asiatic Society of Calcutta, the accompanying portions of a Boodhist Sculpture, (fig. 1.) brought by me from the old town of Arracan; and as they present some peculiarities, I have no doubt that the following remarks will be acceptable.

They formed the upper part of a figure, one of which was sculptured on each side of the entrance into the court of a sort of small cave temple; and they are interesting on account of the Rose which surmounts the figure, and which is identical with the Rosette of Architecture. It was the only one of such emblems, to which I could not at once apply a *Boodhistical* interpretation; and the discovery of this one in a position that could not admit of a doubt of its meaning, and that meaning exactly in conformity with what I expected it would have been, was a source of much pleasure to me.

I will then now proceed to give you a *Boodhistical* view of the emblems of masonry, and I do so with some hesitation at the risk of being accused of riding my hobby, “*jusqu' à l'outrance*,” as I am aware that my remarks are of a speculative character: still, as they are the only attempt that has been made, as far as I am aware, at explaining these architectural emblems on philosophical grounds, they may be both interesting, and the means of drawing the attention of others to similar subjects.

In the following pages I shall confine myself to the explication of those emblematic ornaments which occur in the Doric order, that "first-born of Architecture," because, being the most antient, its emblems are of the most pure and simple type, and have none of those confused and meretricious additions which we find abounding in the later orders, as the Corinthian and Composite.

I have already had occasion\* to remark, that I considered Boodhism to have been a metaphysical system emanating from an Egyptian fountain; that it was introduced at a very early period into Hindustan; that it there became influenced by local circumstances, as also probably by fresh importations from the original source. Boodhism appears, thus, not only to have acquired various local types, but likewise, after being so altered, to have diffused itself, as it were, from new centres of motion, and thus to have given rise by mutual interferences, to varied and mixed results. We find this illustrated in the history of modern Boodhism, (that of Gaudama). We read of its being imported, from a certain source, into regions where it was previously unknown; of its dying away from negligence, or persecution, in its early strongholds; of its again drawing fresh life from its young offshoots; and thus, finally, presenting in its original seat, a phase modified by the provincialisms, with which it had been imbued. This is the case with the Boodhism of Ceylon; which was imported into trans-Gangetic India, became afterwards nearly extinct, and was revived by fresh supplies from Siam, &c. I, in the same paper, endeavoured to trace the mental process by which Boodhism progressed into heathenism; viewing it in fact, as the incipient stage of what is usually styled Idolatry; leading naturally into the degrading cult of Fetichism. I also pointed out how that Boodhism, in its early, and comparatively pure state, (influenced by that craving after substantiality inherent in human nature) endeavoured to realise its ideas, first by numbers, next by symbols consisting of numerical combinations, and finally, by employing living animals, and their representations as types. Considering Boodhism then as I did, as emanating from an Egyptian source, I naturally was led into comparing it with those systems which were acknowledged to have had such an origin, and especially with those which delighted in expressing

\* Vide "Note on Boodhism," published in McClelland's Journal.

themselves by symbols, and representations. We know that those antient mysteries, a lineal descendant of which has come down to the present day, obeyed this description; they were Egyptian in origin, and were symbolic, and emblematic in predilection. It was in these mysteries in which was locked up the craft of Architecture; and it is on the results of that science that we are likely to find impressed the appearances we have alluded to.

The emblematic ornaments then, to which I would draw your attention, are the Triglyph, the Dentals, the Bull's or Ox's skull, and the Patera or Rosette. And before entering upon them I must premise that, if we were to view a building with the eyes of that craft, to whom through a long line of ages was consecrated their structure, and their charge, the ornamental parts would aptly be emblematic of "perfection." Or to use the phraseology of the speculatists, having reared up a mental structure complete in all its parts, and comely in all its proportions, we proceed to add to it those ornaments, and to enrich it with those gifts, which, though not necessary to its usefulness, add to its grace and beauty. It would be needless for me to go through the pages of antient authors to illustrate this point, but we find it abundantly instanced in the writings of Paul, who deeply conversant with those mysteries himself, not only continually endeavoured to point out their hidden purport, but likewise was anxious to connect them with the high spiritualism of the new faith he had embraced. Thus he declares, that Jesus Christ is the "chief corner-stone," (Ephes. ii. 20,) "the true foundation," (1 Corinth. iii. 11.) He then tells his hearers to build upon this foundation, and he reminds them that "every man's work shall be made manifest; (*φανερὸν γενήσεται*, "shall become publicly known,") for the day shall declare it (*δηλώσει*, shall expose it); that it must stand the test of fire, before the workman (*μισθὸν λήψεται*,) shall take his wages; and he curiously adds, that if however "any man's work shall be burned," (*i. e.* not be able to stand the test of fire) *ζημιωθήσεται* "he shall be fined,"\* but he himself shall be saved, yet so as by fire." (*Ib.* v. 13. et seq.) All these are technical

\* This is the most correct and literal rendering of this word, for it is the 3rd person singular ("he") 1st future indicative ("shall") passive voice "be") of the verb of *ῥημα*, which in this voice can only make sense, by having accorded to it its general acceptance of "mulct, punishment by fine."

allusions that must speak to many of my readers; and further to identify them, he actually employs a still more technical phraseology, and commences (v. 10.) by alluding to himself ὡς σοφὸς ἀρχιτέκτων "as a wise master mason," rendered in the established version "as a wise master builder." On another occasion he refers to that Great Architect of the Universe, whom he declares τὰ πάντα κατασκεύασας, hath "built all things," (Heb. iii. 4.) And again he emphatically declares, that it was by revelation that was made known to him the true purport of these mysteries (κατὰ ἀποκάλυψιν ἐγνώρεσέ μοι το μυστήριον. Ephes. iii. 3.) "the revelation of a mystery which had been kept in silence (σεσιγημένου) since the world began." (Rom. xvi. 25.) He asserts, that he was peculiarly sent to enlighten *all men* upon what this "fellowship of the mystery" really is, (φωτίσαι πάντας τις ἡ κοινωνία τοῦ μυστηρίου. Ephes. iii. 9.) And a little further he gives a climax to his spiritualising interpretation of this "fellowship of the craft" by picturing its consequent to be a comely structure harmoniously joined together, and cemented by the secretion of every joint (διὰ πάσης ἀφῆς της ἐπιχορηγίας) in the proportionate and individual action of each separate part, which thus progresses εἰς οἰκοδομὴν ἑαυτοῦ ἐν ἀγάπῃ to the building, (literally, house building) of itself in Love. (Ephes. iv. 16.) Thus closing with the watch-word of those mysteries to which he referred.\*

I shall have again occasion to revert to this portion of my subject, and place beyond a doubt not only the intimate acquaintance that Paul had with these mysteries, but likewise shew that his writings prove

\* What I have advanced here is simply thus : that not only was Paul initiated into those antient and secret mysteries, which were associations of brotherhood; but that he wanted to point out that their inculcations of fellowship and love, and of the performance of high morality were in themselves insufficient; that they required the vivifying Grace of that Being, whose faith he had adopted, and that this mental edifice required to be built up, not upon one's own foundation, but upon the foundation, and in the spirit of Him, whose Apostle he was. Thus he declares, that the true view of these mysteries had not till then been pointed out. Indeed the whole circumstance is one of many instances exemplifying Paul's transcendent qualities as a Pleader; wherever he may be, whoever he may be addressing, he invariably seizes upon some existing peculiarity, some belief identified with local predilections, on which to fix the consecutive glories of the magnificent cause he was advocating; and thus disarming suspicion, and unopposed by prejudices in the outset, he proceeds in one train of powerful induction, to enunciate the startling truths of which he was possessed.









that he truly was, as he declares himself to have been, ἀρχιτέκτων “a master mason;” for that he alludes, as far as he was enabled by his obligations to do, to certain appearances in that grade, which can be appreciated only by the initiated.

Having then thus premised that the ornamental parts of a building were aptly emblematic of perfection, it is only in connection with the idea of objects of perfection, that we must endeavour to search for a resolution of their meaning.








The Triglyph, (“a.” fig. 2.)

The earliest edifices having been of wood, and the more antient type of stone buildings conforming in a great measure in their simplicity to what we might consider the early wooden buildings must have been, most practical masons endeavour to account for the origin of the Triglyph, by viewing it, as a representation in stone, of three props, which were stuck up between the architrave, and that part of the cornice in which the ends of the beams that support the roof, project. And this view seems at first sight plausible, as they invariably occur immediately under the mutules, which last have very much the appearance of the ends of projecting beams. But if the construction of the Triglyph be examined, this will be at once shewn not to be the case; independent of which it is much more probable that the primitive builders put a solid oblong block, to support this most important part of the edifice, instead of leaving it to the strength of three slim sticks, or bits of planks. In fact, it was a solid block which, from the important functions it had to perform, viz. to support in the first instance the whole weight of the roof, and in the second to keep it clear of the architrave, was happily impressed with the most sacred of all emblems, in all ages, among all nations, the *Triglyph*.

This quadrangular block was the prototype of that hewn and “cubic stone,” which plays so important a *role*, in modern masonry. It was, according to Duteil, emblematic of *legal*, as the unhewn stone was of *natural*, justice; and was consequently employed in early ages as the seat of judges, and is, he says, the ξέστος λίθος placed by Homer, in the third Odyssey, before the portals of Nestor. It is likewise an emblem found on Buddhist coins, and has by some been taken for an altar. It will be remarked by examining the Triglyph of Architecture (fig. 3,) that it is so constructed as to leave no dispute of its meaning;

two of the glyphs being complete, (*a a*) the third being split down the centre, and one-half being on each edge of the block of stone, (*b b*). The Triglyph, or combination of three scores, has been throughout all ages the symbol of the Deity, the Tri-une God; we find them variously combined; sometimes in the form of a star , sometimes in that of a  which is the early type of the sacred *Tau*,\* so expressive a character among the antient Egyptians; and generally held to be symbolic of "eternal life." They may be found again thus  And in many other forms, such as  which is the simplified form of the Cabalistic Abraxas, (fig. 4,) typifying the sun, or thus  emblematising the most simple as it is the most powerful resolution of forces, and the one to which all others may be reduced. On the three Yods impressed on the Hebrew Abraxas, (fig. 5,) and the three wings of a hawk, symbolic of the idea "God," found on that of the Egyptian, (fig. 6.) I have already had occasion to remark, (Note on a Boodhist symbolic Coin, published in the Transactions of the Society,) that these three scores compose the word  *Allah*, the term for "God," among the Mohammedans, and which becomes the more marked in the Cufic characters,† composing that word. It is a very common, and abundant figure in Boodhist symbolism, and the interpretation given to it in the paper on the coin just referred to, was immediately acquiesced in by several learned natives and Boodhist priests, to whom it was shewn on my return to Arracan.

\* Vide some remarks on this character by the Author, "Introduction to Grammar of the Language of Burmah," p. xxxix.

† In those characters  the final  is shewn to be a member of the word, and to be radical, the same as in its Hebrew analogue  *alahim*, in which last the *plurality* of the root is evident. Thus in the plural number it is the word used for "God," in many parts of the Bible; and throughout the first chapter of Genesis, especially verse 26.  ויאמר אלהים געשה "Then said the Alahim (God,) *we* will make, &c. &c." The discussion of the characters that compose the Arabic word  is foreign to my present purpose, but I will merely say that I consider the initial  *alif*, in no wise belonging to the word itself, but being a sort of formative prefix, article, or epithetic; that the second character *now* pronounced, and considered a  *lam*, was originally, perhaps long before the existence of alphabetical characters, pronounced as an "*alif*;" and that the *expressive* part of the word consisted, like the Hebrew term, of the *sounds* of simply *Alif*, *Lam*, and *He*. Some of the modern compounds of the word place the view I have given, if not beyond a doubt, at least far within the realms of probability.

I have proposed to myself in this paper to confine myself to a *Boodhistical* view of these emblems; and such view enables us happily to explain the reason why, whilst two of the glyphs are entire, the third should be complete, and yet not whole. According to Boodhism, there first existed *Boodha*, "Supreme Wisdom." From this emanated *Dhamma*, "the Law." And from *Dhamma*, come those who fulfil it, *Thenggha*, "the Congregation of the Saints." These are necessary sequences the one of the other; no second among them being able to be, without that which precedes. *Boodha* has existed, and therefore its emblematic glyph is represented entire, and complete; *Dhamma* has existed, and its emblematic glyph is likewise entire, and complete; but *Thenggha* has not yet perfected its existence, and therefore its glyph is represented as existing, but not perfect and entire.

The Dentals, (fig. 2. "b.")

Immediately under the Triglyph, and on the face of the architrave, we find a number of triangular drops, or figures called from their shape, Dentals, or Dentils. In some cases they are *six* in number, but in others, the more correct and antient, they are *five*. I have remarked, in the case of modern Architecture where there has been a vitiated triglyph composed of three *whole* triglyphs, (fig. 7.) that the Dentals are six in number; whereas when they occur in connection with the true triglyph, they are five. The number five in the mind of a Boodhist typifies the five commandments, in fact the law;\* but it is singular, that if such a one, speaking the Pali dialect, were to draw the attention of another person to these Dentals, he would employ the term *pěgnytsěng*, (pronounced something like *peentseng*) to identify them; and this is the technical term employed to express the five commandments.† This

\* Conf. Grammar of Burmese Language, p. 90.

† As it bears upon the typical value of the number "five," I have inserted the following portion of a note published in the work already alluded to "the name of the number five" (*pegnytsa*.) in the Pali language is composed of *pegnya*, which implies "wisdom, understanding;" the final *tza*, is an expletive in very common use in the Pali language. It has been shewn (p. 90) that, in the eye of the modern Boodhist, the number 5 typifies the five commandments, in fact the law. It will be self-evident to the intelligent mind, how naturally that the fulfilment of the law was identified with "wisdom," and "understanding." Examples might be multiplied to show that it was so in the minds of the early races of mankind: "Behold, the fear of the Lord, that is wisdom; and to depart from evil, that is understanding." (Job. xxviii. 28.) "Give me understanding, and I shall keep thy law; yea, I shall observe it with my

word is composed of the roots *pěgnytsă*, or *peentsă*, "five," and *ănga*, "parts." The term *ănga*, however, has a somewhat peculiar power, it not only means the "part" of a "whole," or the "member" of a "body;" but it implies that such "part" or "member," as far as regards its own individuality, is a complete object in itself. Thus, (Judson's Burm. Dict. in voce.) the cavalry, infantry, elephants, and chariots of an army, are styled *ăngas*, of that army. And it is thus that these five distinct Dentals having each an individual completeness in itself; but going towards the composition of a whole, would be styled *pěgnytsěng*, "the five *ăngas*." I have already observed that, speaking Boodhistically, from "Supreme Wisdom" "(*Boodha*) proceeded the Law," (*Dhamma*). Or to speak in other words, it (*Dhamma*) may be said to be the mode in which *Boodha* ("Wisdom") manifests itself to the *Thěnggha*, or "Congregation." Thus, as far as regards that "Congregation," *Dhamma* is "Wisdom." Or to speak so as to be understood by Christians, the Deity can only be appreciated by his followers in what he reveals of himself; now the revelations of himself by the Deity, to be consistent with the awful grandeur of his character must necessarily be commandments, the dictations of His Will. For it would be utterly inconsistent with a proper appreciation of that Being, to hold that he converses, in the usual acceptance of that term, with His creatures. This idea is carried out in all Eastern dialects; a term such as the Persian فرمودن *firmoodun*, which, when applied to the act of an equal, would imply "to order;" when referring to that of a superior, simply conveys "to speak, say." I have been particular in explaining, how that in one point of view the Deity (*Boodha*, "Wisdom") and His Law (*Dhamma*) are identical, and have mentioned that this *Dhamma* is typified by the number "five;" for thus is explained how the Pali name of that number (*pěgnytsă*) is deducible from *pěgnyă*, "wisdom;" and it may guide us to the understanding of Hor Apollo, where he says (Lib. I. c. 13.) that among the

whole heart." (Ps. cxix. 34.) The same connection between "knowledge, wisdom, and understanding," and the precepts of the law, exist in the Burmese language.

The pure Burman term for these five commandments is ထိင်္ဂ *thiedeng*, which implies "news, information;" and is composed of the root ထိ *thie*, "to know, perceive, understand," and င်္ဂ *teng*, (with, or without the points) "to contain, hold, &c." Introduction to Grammar of Burmese Language, p. xi.

antient Egyptians a star represented "the Mundane God, likewise fate, likewise destiny," likewise the number "five." This Star was five-rayed, and is used in those mysteries, which have come down to us to represent the same idea that it did among that people; and, from what has been said, it is probable that it did not exactly represent the idea of "God," but of that revelation of Himself alone appreciable by men, viz. His Law. The five commandments composing this Law are merely inculcations of those duties, the performance of which is absolutely necessary for the preservation of social order, and happiness; in fact, they are the five points of fellowship, viz. refraining from, 1st, *panatie-pata*, "destroying life;" 2dly, *ādiennadana*, "theft;" 3dly, *kaméthōōmiets-tshatsara*, "adultery;" 4thly, *mōōthawada*, "falsehood;" and 5thly, *thooramérāyāmādzdzhāpamadāhtana*, "intoxicating drinks." It will be remarked how truly all these may be styled points of fellowship, referring as they do solely to those duties necessary for the maintenance of order in society, and not, as in the Decalogue of the Hebrew, inculcating any of the obligations due to one's God. Another connection between the number "five," and a "god" in Boodhism, is shewn by the circumstance that Boodhism holds that there are "five Boodhs,"\* who characterise the present world; four of whom have appeared, and the fifth who is yet to appear. We find a similar connection existing in reference to their sacred number, in *Brahminised* Boodhism as it obtains among the Nepalese, for they hold that the number of Boodhs is "seven;" (vide, Hodgson's Tracts on Boodhism,) that being a sacred number in Brahminism, and among the Semitic families of the globe, but enjoying no particular sacred value in true Boodhism.

Having thus discussed the Triglyph and Dentals, we will proceed to those ornaments which are generally placed on the metopes of the frieze. These generally are the head of a dead Bull, or Ox; or a Rose, or Rosette, generally styled a "Patera." I have already remarked, that it is only in connection with the idea of perfectibility that we must endeavour to realize the symbolism of these emblematic ornaments. We have already seen how that *Boodhistically* viewed, the Triglyph emblematises the union of *Boodha*, *Dhamma*, *Thënggha*; forming when

\* A *Boodh*, comes nearest among them to the definition of a God, being the sole true object of worship.

united the *Thărăṇḍgōṇ*, "the Supreme and decisive attributes." It is thus that in the Burmese (a Boodhistical) language, when the term *thōṇ*, "three," is applied in an attributive signification to a person, in fact if it be said, "so, and so threes," it implies that he performs those moral duties and obligations, that make him a member of the *Thěnggha*, that "Congregation" who fulfil the "Law," thus making himself one of the THREE. I have also endeavoured to shew how that viewed in a similar light, the Dentals would admirably represent *Dhamma*. And now I proceed to point out how that the Ox's, or Bull's skull, and the Rose, in the same way, represent the numbers of the *Thěnggha*.

We will recapitulate that the earliest symbols by which Boodhism endeavoured to represent her ideas were numbers. This we have shewn by the attributive signification of certain numbers in Boodhistical languages, which only can be accounted for by their allusions to certain tenets of the Boodhist faith. For instance, if it was held that such and such, or so many components, or qualities, existed in the various individualities of the physical and metaphysical world, then the name of that number necessarily conveyed the idea of, and typified them. The next step was materialising into tangibility these numerical types; this was done by the corresponding number of marks or scores. This class of symbols appears to have been more used for the illustration of those higher objects and ideas, which did not pertain to mankind, and his converse here below. Soon, however, certain objects of the animal creation were chosen, on account of certain peculiarities in their temper, conformation, or mode of existence, to represent cognate ideas, especially in connection with the correspondent qualities among mankind. Thus, there are three grades in the *Thěnggha*. 1st, the *Boodhithatwa*; 2ndly, the *Pratyeka Boodha*; 3rdly, the *Thrawaka*. The first was typified by an Ox, the second by a Deer, and the third by a Sheep. (Conf. Travels of FOUÉ KOE KI, by A. Remusat, p. 10.) The first then is the one to which we must look for the interpretation of this Ox's or Bull's skull,\* which we find forming an ornament of these friezes, (fig. 2. "c.") I am aware, that it has been generally attempted by practical masons to explain the presence of this skull, by holding it to

\*This mode of representation by synecdoche is very abundant in hieroglyphic, and emblematic sculptury; the head being employed as an abbreviation of the whole animal: thus we say, so many "head of cattle."

refer to the sacrifice of bulls and oxen;\* but then in that case, it would have been the representation of the head of a live animal. Duteil considers, that the circumstance of its being the head of a dead animal, (referring to the instance of the representation being that of dead Ram's head,) alludes to the destruction of the world by fire, when by the precession of the equinoxes the sun shall again lead the opening year in the constellation of Aries. (Dict. des Hierog.) Dupuis likewise (Origine de tous les Cultes,) declares the worship of the Bull originated at the period when that luminary opened the year in Taurus. Indeed he considers that all the various religious myths referred to the sun. That Hercules in his twelve labours was the sun in his twelve zodiacal signs; that Jason in search of the fleece of Colchis, was a mythological allusion to the god of day entering Aries; he supports the accusation, brought by its early opponents, that Christianity was a species of Mithraism, and declares that the birth of Christ was nothing but a spiritualism of the sun in Virgo. Without disputing these positions, we have still to account how this animal was held in such high veneration, as to have had accorded to it, with others, this stellar apotheosis, necessary to have enabled their version of the myth to have had an origin. We see how Boodhism explains this by having employed them as types, and the animal under discussion, as the representative of the highest moral perfection that humanity is capable of; and I shall proceed to show how perfectly in keeping it was that the crowning point of this perfection should be held to be "DEATH."

It is the *Boodhihatwa* "the perfecter of wisdom," who alone is able directly to attain *Niebhan*, "the not to be," without having to undergo any more transmigrations. It is for this state of annihilation that every Boodhist pines; and *it* can be attained but by death alone. In all those mysteries which were held in such high veneration by the Antients, and the types of which have descended in a chain of unbroken succession even to our own days, the attainment of the crowning point of the craft was typical of Death. It was alone by passing through the vale of its shadow that perfect light could be obtained. Apuleius, in the eleventh book of his *Metamorphosis*, or *Fable of the Golden Ass*,

\* It is singular to remark how rapidly this mistaken idea was adopted by the Greeks; for we find very often the friezes of the Corinthian order occupied by a long sacrificial procession.

describes minutely this completion of initiation: the night-like darkness; the approach to the confines of Death; and then in the very midst of this darkness, the light revealed to him. In some of the various versions of these mysteries, it is said that the candidate was shrouded in the shudder-cloth of Death, was placed in that narrow home to which we all must go, was raised again, and went forth the new-born, and perfect craftsman. In others, it was represented by the candidate passing through an oval, symbolising that as he entered into this scene of woe, so must he go forth again. Thus was it that we find Death styled in antient writ "the portal of life." It was thus that clefts in trees, and openings in rocks were ever held in veneration among the vulgar of all nations; passing one's body through them is a regenerating process gone through by Hindoo devotees in the present time, and even in our own land the practice it is said exists in some parts of the country of passing children through such openings to cure them of the rickets. A similar ceremony is the bathing in those *khonds*, (typical of the opening of the womb,) or still pools, where a river enlarges into a circle, and which is held in India as a regenerating process.

We find the Apostle Paul referring in a most marked manner to certain appearances in the celebration of this grade, and he too yearns for the time when he shall know perfectly. I allude to the often-quoted chapter the 13th of 1st Corinthians. The word there translated "charity,"\* is in the original ἀγάπη "love," and implies that bond of brotherhood which ever was the watchword of those mysteries which he speaks of in the 2nd verse of the chapter. The whole bent of the chapter is singly this; it is one of the many allusions he makes to these mysteries, and he says, that although he may be ever so well read in them, and be able to expound them ever so clearly, yet if he is not imbued with that "love," which is the foundation-stone of them all, it profiteth him nothing. And he goes on to say, that in this life we can but know in part, and we prophesy (announce) in part; but that when the end shall arrive, then that

\* The word "charity," in the confined import which we give to it, is little else than ἐλεημοσύνη "alms-giving;" but it is derived from the Greek *χαρις-ιτος*, which is a most expressive root, implying that union of "mercy, thankfulness, and love," which goes to the composition of that exquisite quality "grace;" a quality which, whilst it is an attribute characteristic of a God, is still to be discerned in the tracery of a leaf.



which is in part shall be thoroughly rested from labour. I quote the original with the accepted rendering, and will detail why I give the metaphrastic version above. ἐκ μερους γὰρ γενώσκομεν, καὶ ἐκ μέρους προφιδεύομεν· ὅταν δὲ ἔλθῃ τὸ τέλειον, τότε τὸ ἐκ μερους κατερηθήσεται. "For we know in part, and we prophesy in part. But when that which is perfect is come, then that which is in part shall be done away." The word here translated "prophesy," is προφιδεύω, and implies correctly, "to announce, explain," as the oracles of a God. The word rendered "perfect," is τὸ τέλειον, the neuter of the adjective of τέλος, "the end." This connection between the ideas of "end" and "perfection," exists in all languages. The word rendered "shall be done away," is καταργηθήσεται, which literally bears the interpretation I have given it; κατα in composition implying, "completeness, thoroughness;" and ἀρλέω being derived from a privative, and ἔργον "work." He proceeds in his allusion, and says, "For now we see through a *glass* darkly; but then face to face: now I know in part; but then shall I know even as also I am known." It is easy to perceive to what he refers, when he says that it "was seen through a glass; but *then* face to face;" the "then" alluding to the time when that which was in part should be done away, when that which is perfect, (the end) is come; the seeing it "face to face," alludes to when he shall stand in the presence of the Great Revealer of all secrets, who will then expound to him all the mysteries of His Will. What is still more singular is, that the word rendered "darkly," is in the original ἐν αἰνίγματι, "in covert allusion," or "emblematically expressed." We may gather then the following particulars from this description: 1st, of all that he refers to something typifying the approach of death, the coming of the τὸ τέλειον; 2ndly, that during that, something typifying Death, he saw something through a glass; 3rdly, that this last was expressed enigmatically, or by an emblem; and 4thly, that it in its enigma referred to the Revealer of all mysteries, whom he was to stand "face to face," with, when the time came that he should know, even as also he was known. We have seen how that among the antient Egyptians, the first mystagogues of Antiquity, this Being was emblematically represented by a Star; and we have said that the Egyptian Star was invariably five-rayed.

I have thus, I trust, sufficiently explained why this Bull's or Ox's skull, typical in Boodhism of the highest grade, the *Boodhithatwa*, is represented as pertaining to DEATH; that END being itself most essentially necessary to the fulfilment of perfection.

Rose, or Rosette.

We now come to the last of these emblems, which I propose to discuss; viz. the Rose-shaped Ornament often found occupying, like the preceding, the metopes of friezes. This ornament is, I believe, generally styled a "Patera," by practical architects, and is held to be a representation of the dish which was employed in the presentation of offerings among the Antients; but it must be a singular sort of a dish to have the petals and stamens of a Rose. It is met with under variously altered forms, sometimes presenting a type so vitiated, as to have lost almost all its floral characteristics; but it is much more similar to a Rose, than is the so-called Rose Ornament of the Corinthian Abacus, which we shall have occasion to discuss more fully. In the case of modern buildings, where, on account of their public character, attention has been paid to their details, I have observed that this ornament has preserved, if I may use the expression, its botany; whereas in private, or carelessly executed edifices, it is difficult at times to recognise it. It is found alternating with a sort of lily-formed flower at the base of the Doric capital immediately above the Astragal.

Considering it then, as I did from the very first, as a Rose; it was as I have remarked in the commencement of this paper, the only one of these ornaments to which I could not immediately apply a Boodhistical interpretation. Still, as Boodhism was so fond of recording her ideas in symbols, and as she was by no means restricted in her choice to the animal kingdom, and as this emblem, from its occupying the position of others importing "supremacy and perfection," must necessarily have had a kindred power; it appeared to me in fullest keeping, that the Rose should be there, as the most appropriate deputy from the floral regions of Creation, the fittest representative "after its kind" of such high qualities. It was therefore with no small delight that I found this regal flower occupying a place in Boodhist sculpture, which left no ambiguity to its meaning; and in a position identical with that in which it is often found in modern Architecture, viz. on each side, and

towards the upper angle of a porch, or gateway. This signification, then, which I have thus accorded to the Rose, of typifying "supremacy and perfection, chieftom and eminence," is one that must find a confirmation in every intelligent mind. There is a curious passage in the second book of the "Erotics" of Achilles Tatius, describing the loves of Clitophon and Leucippe, which happily supports my views—  
 εἰ τοῖς ἀνθεσιν ἤθελεν ὁ Ζεὺς ἐπιθεῖναι βασιλέα, τὸ ρόδον ἂν τῶν ἀνθέων ἐβασίλευε. γῆς ἐστὶ κόσμος, φντῶν ἀγλαΐσμα, ὀφθαλμὸς ἀνθέων, λειμῶνος ἐρύθημα, κάλλος ἀστράπτων. ἔρωτος πνέει, Ἀφροδίτην προξενεῖ, εὐειδέσι φύλλοις κομᾷ, εὐκινήτοις πετάλοις τρυφᾷ. τὸ πέταλον τῷ ζεφύρῳ γελᾷ. "If Jove were desirous of placing a lord over the parterre, surely the Rose would king it among flowers. It is the ornament of the earth, the beauty of plants, the beloved (literally, the eye) of flowers, the blush of the meadow, dazzling in its loveliness. It breathes Love, it invites Venus, it is tressed in beautiful leaves; it luxuriates midst the trembling foliage, and its petals laugh in the zephyr."

I have already remarked, that this Rose (fig. 1. "a.") (which it will be particularly noticed is meant for a wild or dog Rose) was found in a position that left no doubt of its being typical of supremacy; for it is placed (characteristically) over the head of a figure holding the umbrella, an insignia of royalty and supremacy, among all nations under the sun, (or more correctly perhaps in proportion as they were under sun) and crowned likewise with the tiara of chieftom, the prototype of that which we find adorning the head of images of Siva, and of which a representative has descended to the present day, and is used in theatrical performances in Burmah and Arracan, as the head covering of kings and princes. Thus the whole figure may be read, 1st, from the insignia in its possession to have been a royal personage; 2ndly, to have been a *Boodhithatwa*, from the Rose typical of that grade being placed characteristically over its head. It is thus I consider it to be meant for a representation of Gaudama when he was on this earth, but previous to his being imbued with the Boodhic spell. This mode of placing an object over a figure to characterise it, is found abundantly in antient Sculptury. Thus we see the five-rayed

Star of Destiny, of which we have spoken so often, placed over the head of a figure, (fig. 8.) representing that Deity. The Rosette likewise forms an expressive ornament of the most important portion of the clothing, in fact of the badge of the modern mysteries.

A circumstance to be noticed in this figure is, that the ears are represented with the lobes pierced, and filled with small cylinders, by which the bottom of the ear is brought nearly as low as the shoulder. This is a peculiarity that exists in all Boodhist figures throughout India, and is a fashion that still prevails in India beyond the Ganges, and in those mountainous ranges where Braminism has never obtained. It is most probable that this custom was adopted from the traditionary belief, that the ears of Gaudama were so formed ; for we find it recorded of that god in Boodhist scriptures, that his stature was eighteen cubits ; and that the lobes of his ears rested upon his shoulders. This mode therefore of piercing, and loading to distention, the lobes of the ears, appears to have been adopted in remembrance of that divinity, and to have deserted the plains of Hindostan, and to have taken refuge in farther lands, and inaccessible recesses together with that worship of which it was one of the accompaniments.

Before bringing my communication to a close, I must refer to one other architectural ornament, a portion of which is found as a very abundant symbol on Boodhist coins ; I allude to the so-called Rose Ornament on the Corinthian Abacus, (fig. 9). There, however, can be no mistaking the flower to be a representation of the Helianthus, or sun-flower, which appears in this instance to have been employed to symbolise the Sun ; for from it proceeds a vivifying ray which terminates in a triple head.\* This flame-shaped symbol, but without the triple head, is found on Boodhist coins, (fig. 10). No definite meaning has been given to it. Marsden declares it not to be the representation of a "flame," but of the conch sacred to Vishnu ; but Boodhism holds nothing of that god. Its character however is sufficiently determined, from the circumstance of its being found in identically the same form

\* It is singular that this might almost express the amount of the knowledge, which moderns have arrived at of the components of the Solar ray being three ; the illuminating ray, the heating ray, and the chemical ray. It is not, I believe, yet satisfactorily settled whether there is not a magnetic ray. The other three are, however, acknowledged.

on the hieroglyphic sculptures of Egypt; sometimes by itself, sometimes rising from a sort of lamp, or cresset, (fig. 11). Champollion mistook it for a "tear" (𐤔𐤕 𐤏𐤏 𐤇), and therefore consigned to it, in his phonetic system, the power of an "R."

There is another symbol of frequent occurrence on Boodhist coins, especially on the one which you did me the favour of submitting to my inspection, and of which a description and explanation has appeared in the Journal of the Society. I give a representation of that side of the coin on which that symbol occurs, (fig. 12). In the paper alluded to, I declared that to a person acquainted with Boodhist cosmology, there could not be the slightest doubt, but that the whole of that side of the coin was intended as a symbolic representation of former universes in general, and of this universe in particular. And I moreover declared, that although I could not give any definite interpretation to the symbol occupying the centre, shewn detached at fig. 13; yet that from its relative position, and granting that my interpretation of the rest was correct, there was no doubt in my own mind that it was meant to represent this world in particular. I am glad to be able to say, that the whole of my views in reference to that coin, have since met with the valuable acquiescence of a friend, (Captain Phayre, Assistant Commissioner of Arracan,) who is not only deeply read in Boodhist literature, but has likewise an extensive collection of these coins. It is singular, however, that the following simple interpretation of that symbol, should not have occurred to me at the moment. We know that among the cabalists, as well as among others whose systems originated in the same source, the triangle with its apex upwards typified "fire," as did that with its apex downwards, "water." In the antient system of ideographic representation, when an object was represented repeated more than once, it signified "plurality, reiteration," in reference to that object. Now the two sets composing this figure are so represented, with their points meeting in a circle, (the universe), having a point within it (this globe); thus symbolising the reiterated effects of fire and water upon this mundane universe; which agrees exactly with Boodhist cosmology; for according to it this world has continually been alternately destroyed by fire and water; whence its Pali name *lāṅgā*, from *lāṅ*, "reiteration, to be again and again."

Yours faithfully and truly,

THOS. LATTER.

P. S.—Since writing the above—on shewing my explication of the side of the coin above referred to, and especially of the central emblem, to an intelligent Boodhist priest, he was much delighted with, and acquiesced in, it. On being asked what he had hitherto considered the central emblem to have referred to, he replied; “to the *Rajpaleng*, or throne, on which Gaudama was impregnated with the Boodhic spell.” On being pressed for his reasons, he said, “because it bore a resemblance to that species of foot-stool, called a drum *Morah*!” It is thus, that a somewhat similar shaped figure has been so employed in the pictorial representations of the life of Gaudama. With reference to the Rose-shaped Ornament discussed, I may be accused of a botanical inaccuracy, as the number of petals in the species *Rosa arvensis*, and *Rosa canina*, are “five;” whereas that of those in the representation on the sculpture are “eight;” but to this I attach but little importance: 1st, because the whole appertains to a rude, and inaccurate age; and 2ndly, because it is peculiarly the genius of the Burmese language to style, and consider as a Rose, any rosi-form flower. With reference to the Dentals: they appertain, I believe, principally to the Ionic order, and are of rarer occurrence in the Doric. In the secluded locality from which I write, I have no means, in order to determine their proper number, of consulting any standard works on the subject; but in the case of modern buildings of a public character, I do not remember to have met with any other number than “five.” I may as well mention, that the present is not the only instance in which the Rose forms an ornament in Boodhist architecture; they were found in abundance in various other Boodhist cave temples, which I visited in old Arracan Town. I was likewise informed by a friend, who had visited most of the cave temples of Western India, that the Rose is found alternating with a horse-shoe device, and with a tiger’s head; and others, as ornaments on the friezes of those reliques.

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fig 5

fig 4



fig 1

fig 2



fig 6

fig 7



B fig. 2.



fig 9



fig 10



fig 11

fig 12



fig 13



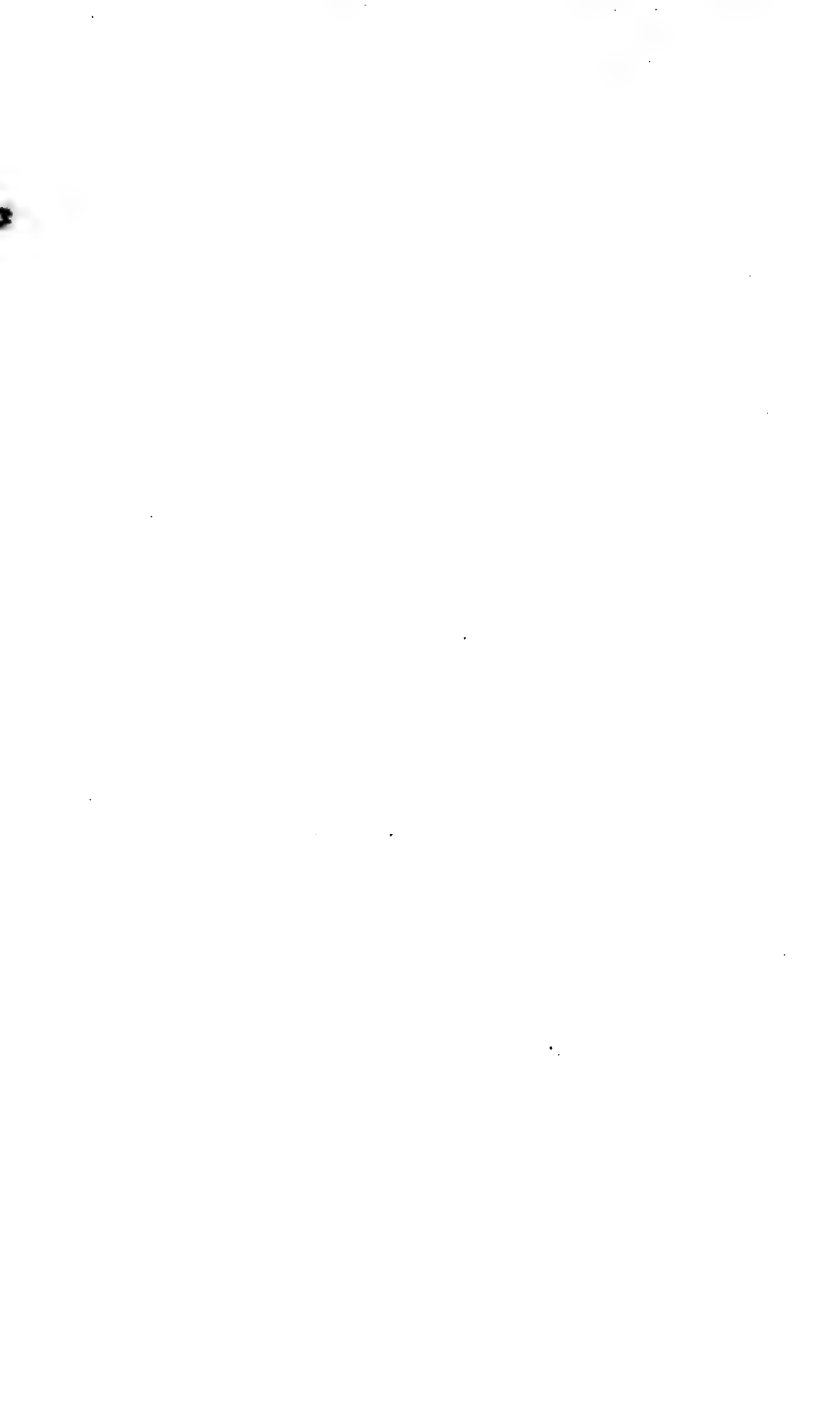
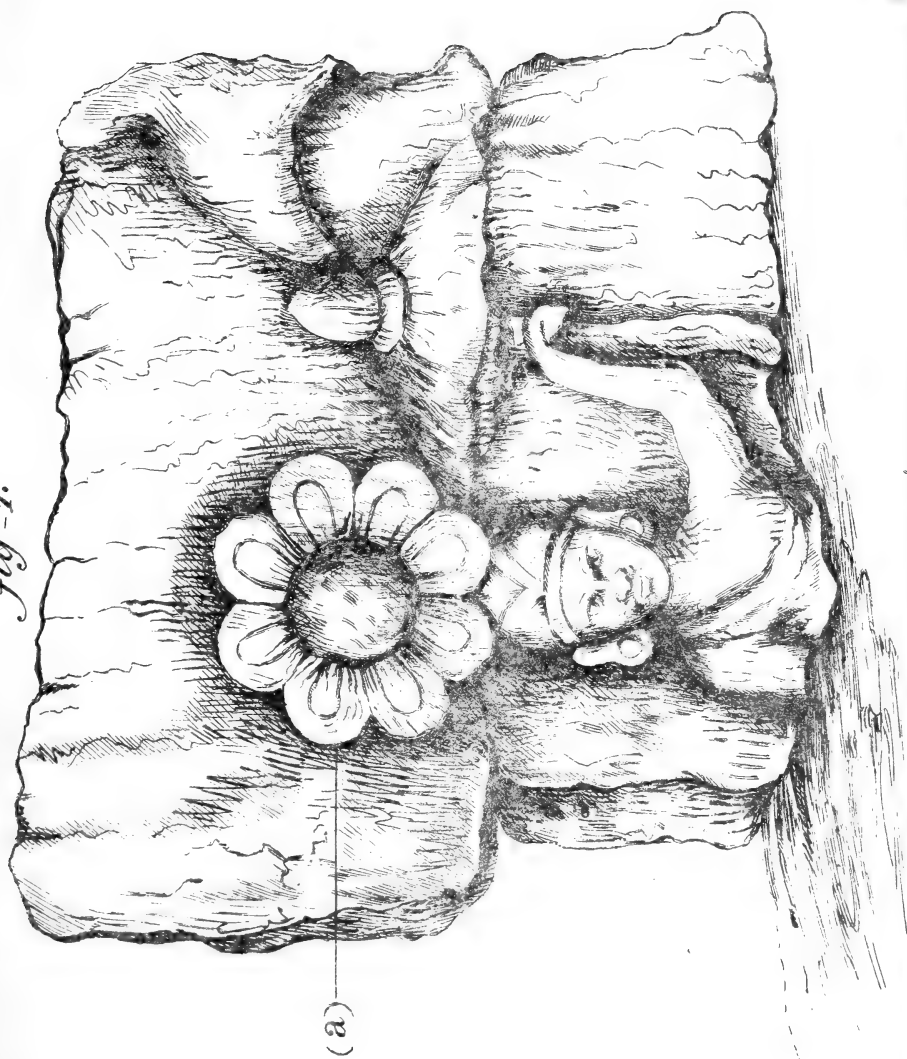




fig-1.



(a)



*Notes, chiefly Geological, across the Peninsula from Mangalore, in Lat. N. 12° 49', by the Bisly Pass to Madras, in Lat. N. 13° 4'. By CAPTAIN NEWBOLD, F. R. S., M. N. I., Assistant Commissioner, Kurnool.*

Mangalore, the civil and military head-quarters of South Canara, and a seaport of considerable traffic, stands on the Malabar, or Western coast of India, in Lat. 12° 49' N., Long. 75° 0' E.

It is situated on a sort of peninsula or tongue of land between two rivers, which unite in its front in an extensive backwater, or lagoon, almost shut out from the sea by a long narrow bank of sand. There was formerly a deep opening on this sandbank by which ships could enter the sheltered waters of the lagoon after being lightened of their cargo; but its depth has been considerably lessened by the formation of another opening. The Coast patamars and Arabian buggalas can still pass into the lagoon with safety.

The rivers are navigable for country boats nearly to the foot of the ghauts, and form advantageous channels of commercial communication with the interior. The principal exports are to Surat, Bombay, the ports on the Malabar Coast and Arabia, and consist chiefly of rice, betel-nuts, pepper, cardamoms, cassia, sandal-wood, turmeric, and salt-fish. The chief imports are cloths from Bombay, Surat, Madras, Bellary, Bangalore, and Cuddapah.

The higher parts of the peninsula present a thick bed of laterite, intersected by small flat-bottomed vallies opening out towards the sea, and flanked by steep hills of laterite. The summits of these hills are usually flat, like those of trap or sandstone, with steeply sloping sides and occasionally precipitous cliffs. In structure the laterite is porous, and sometimes cavernous. Dr. Herklots, in his Account of Mahomedan Customs, describes the sacred shrines of Shaikh Fureed at Cuddry, about two miles from Mangalore, as being situated in a cave in a centre of a perpendicular rock composed of laterite which is said to lead all the way to Hydrabad, 450 miles! The extent, which cannot be very great, has not yet been ascertained.

*Arcola, or Feringhipett.* From Mangalore by Cuddry Devasthanum, and Koonoor to Arcola, about nine miles, the road lies over laterite, and lateritic gravel. About two miles on the east of Mangalore, on a

laterite hill in mid air was swinging (June 16th 1837) the decomposing body of the rebel, Bungar Rajah—the gibbet creaking in the wind. His predecessor had been hanged by Tippoo for *his loyalty to the English!* Arcola stands on the North bank of the Comardaire, or Southern Mangalore river, and is called Feringhipett, from the circumstance of its being the early residence of the Concan Catholic Christians under the protection of the Sekeri Rajahs, and who were latterly expelled by Tippoo when he destroyed the town. The remains of the old church stand on the hill, built in the usual massive Portuguese style. The tide is said to come up to this place.

*Buntwal.* Buntwal also lies on the N. bank of the S. Mangalore river. The country between this and Mangalore is hilly, composed of small hills and vallies watered by rivulets. Where rice cultivation does not prevail, the surface is covered with scattered brushwood and palm trees. The soil is red and lateritic. The hills are generally rounded, or run in the flat-topped, crescent-shaped curves, like those near Capergode. All that I had an opportunity of examining were of laterite; but hornblende rock containing a dark foliated mica, is seen in angular blocks in the bed of the river at Buntwal. The river here is apparently from 150 to 200 yards broad, and now (June 1837) unfordable. Native boats of considerable size ascend the river from Mangalore; Buntwal and Pani Mangalore being the principal entrepôt with the interior. The masses of rock in the river bed are considerable impediments.

In Buchanan's time (1801) Buntwal contained only 200 houses, but then it had suffered from the forays of the Coorg Rajah. It is now (1837) said to comprise 800 houses, inhabited chiefly by Moplay merchants, Concanis, and a few Jains. It is also capital of a taluk, with a population of about one lac, and a revenue of nearly two and a half lacs of rupees.

That curious sect the Jains, have a *busti* here. The charred rafters and roofless walls of many of the houses attest the ravages committed in the insurrection just quelled, (June 1837).

*Uperangady.* From Buntwal easterly, as the ghauts are approached, the surface of the country becomes more jungly, less cultivated, and less populous: the formation still laterite, covering granitic and hypogene rocks, which are occasionally seen in beds of rivulets and low

situations. The road still lies along the N. bank of Comardairi, or S. Mangalore river, which just below Uperangady bifurcates: the north stream descends the ghauts in the vicinity, and the south stream rolls down the steep of the lofty Subramani. The former is crossed to the village, now (June) unfordable.

Across this ford a dash was made on the insurgents by Colonel Green's force, the pagoda fired, and the principal idols defaced and broken; nothing remained but the tiled porticos and blackened walls. The natives were carefully collecting the fragments of their desecrated gods, and piling them up in the best order they could. The village is large and populous, and contains besides Brahminical temples, a mat'h of the *Jungums*, priests of the Lingayet sect, and a Jain *busti*.

*Cuddab.* From Uperangady to Neranky, and thence to Cuddab, the surface becomes more rugged and hilly, and the jungle, which is said to be infested by elephants and tigers, higher and thicker. The road leaving the northern branch approaches the southern, or Subramani branch of the river. One of its tributaries, the Dhillampari, is crossed by boat to Cuddab, a village containing many Concani Brahmins, with Goadahs, Tulavas, Bunters, Walliars and Jains, the last of whom have a *busti* here. I could scarcely find food or shelter, the shops and Traveller's bungalow having been burnt by the insurgents. The Bungar Rajah was, I believe, captured near this, in the house of a Jain. The geological formation continues much the same as on the last march.

*Bottom of the Bisly Ghaut.* The road to Culgund lies over hilly, jungly ground. Two small tributaries to the Subramani river, the Bilola and Cuddoo, are crossed; both fordable, though the monsoon rains are now descending literally in torrents, and the rocks and precipices alive with leaping muddy rills. The jungle leeches were here equally alive, and vigorous in their insidious attacks, and before I was aware of their presence, had nearly fainted from loss of blood with which my shoes were filled.

The first sensation is that of itching; and, in withdrawing the hand from relieving that sensation, the traveller finds it covered with blood. In a state of fasting this animal is rarely more than an inch long, and hardly so thick as a small fiddle string. It has evidently keen powers of scenting blood, and if the traveller stop but momentarily in the road, they fasten on him in astonishing numbers, raising themselves on their

tails to strike like so many little *cobra de capellas*. Until gorged with blood, they move in this way with considerable rapidity. I have only found them troublesome during the monsoon, when the paths and trees are dripping with rain. In the dry season they retire to the marshes and other moist situations. Dr. Davy describes a similar sort of jungle leech in his History of Ceylon,\* and says that their bites have in too many instances occasioned the loss of limb, and even of life. He mentions various remedies, but I found the best was to wash the leg with tepid water at the end of the march; rest it, and to avoid, above all things, scratching the bite. In case of a wounded vein, burnt rag may be applied to stop the hæmorrhage.

Culgund is a revenue choukie; contains about thirty or forty houses chiefly of Goudahs, Komtis, and a few Attiah brahmans; and was lately occupied by the insurgents under Appiah, Mallepa, and Timmapa Goudah, who were however soon dislodged by Colonel Williamson's force, which marched down the Bisly Ghaut from Bangalore.

About two miles from Culgund I crossed the Udhulla stream, which was then running with frightful velocity, on a rude raft hastily constructed on the spot of a few green bamboos lashed together.

The sand of this stream abounds in bits of garnet, quartz, and fragments chiefly of hornblendic rocks, which now become the principal surface rock, though covered by thick beds of red clay into which the hornblende schist passes by weathering. Laterite is now seen less frequently, as the ascent of the ghauts commences at the bottom of the Bisly Pass, about one mile from Udhulla.

*Ascent of the Bisly Ghaut.* The ascent lies up a transverse break in the lowered prolongation of the ghauts, immediately to the north of the mountain Subramani, and for some distance along the right bank of the Subramani river. This sacred mountain is the highest peak in this part of the ghaut chain, though only rising, it is said, to the elevation of 5611 feet above the level of the sea. Its summit was concealed in monsoon clouds, but its bare shoulders of grey granite rise in a magnificent sweep from the green forests which mantle its back, and fringe its base.

After leaving the river bank of the stream, the road leads for four miles up the steepest part of the Pass, relieved here and there by short

\* Travels in Ceylon, pp. 103 and 104.

flat steps, or terraces, till the summit is attained ; when the route lies along a cross valley having high hills on both sides, round the bases of which the road winds for some miles to the clear table-land of Mysore, where the land subsides in long gentle swells covered with delicious verdure, and the dense jungle breaks in plantation-like patches, and umbrageous clusters of noble trees. In the gorge of the Pass lay the broken barricades of the insurgents.

At the western foot of the Pass, and along the base of the Subramani, hornblende rock, containing garnets and dark-coloured mica, occurs, with veins of a very large grained granite composed of white quartz, red and white felspar, and silvery mica in very large plates ; gneiss is seen on the steep face of the ghaut, and hornblende rock often coated with the red clay, and its own detritus. This formation continues to the summit of the ghaut.

*Uchinghy.* The formation here is generally gneiss. One of the hills of this rock is crested by hornblende rock in large prismatic masses. Patches of laterite occur, covering these rocks in various localities, and a few bosses of granite.

*Kensum Ooscottah.* This village is fairly on the table-land : near it I crossed the Hemavatti, one of the principal tributaries to the Cauvery, in a canoe. It is about fifty paces broad, with steep banks of clay, silt, and sand with mica. Near a temple to the Lingum in the vicinity of the village, mammillary masses of gneiss project from the red alluvial soil. This rock has here lost much of its quartz, and is of that variety of thick bedded gneiss which, in a hand specimen, might pass for granite ; the felspar is often of a reddish tint. Laterite is found in this vicinity a little below the surface in a soft sectile state.

The face of the surrounding country is diversified with low-rounded hills, often covered with a red clayey soil, which yields during the moist months a verdant carpet of short grass.

Springs of good water are found at depths of from twelve to eighteen feet below the surface. Rice and raggy are the staple articles of cultivation.

Ooscotta comprises about one hundred houses, inhabited chiefly by Lingayets and a few *Carnati* brahmans of the Smartal and Sri Vaishnavam sects, and a few Dewangurs.

A solitary Sri Vaishnavam brahman resides in the fort. The fort is said to have been built or greatly improved by Hyder, but is a place of

no greater strength than the ordinary second class ghurries of S. India. It contains two temples, one dedicated to *Iswara* and his consort *Parvati*, and the other to *Angini Dewi*. There are two others in the Pet-tah, to Angini and Buswunt. The staple articles of cultivation are rice and raggy.

*Pallium*. The road from Kensum Ooscotta into Mysore, lies over an undulating country, on the surface of which the dwarf thorn and aloe begin to be more thickly sprinkled than nearer the ghauts. Gneiss still outcrops in mammillary masses from a reddish alluvial soil. Here is a Jain temple to *Pursonath*, and an old pagoda to *Jinadur*. There are several Jain families still residing here. Some miles to the N. is the famous ancient capital of Hallibede, where there are some Jain *bustis*. Most of the inscriptions I have had copied.

*Hassan and Gram*. Gneiss and hornblende schist are still the prevalent rocks. Talc slate with layers of a fine greenish potstone interstratified also occurs, of which the elaborately carved walls of the temple to Keysu Dev, are constructed. At Hassan there is a large fort repaired by Hyder and Tippoo, with a glacis, covered way, dry ditch, and a sort of *fausse braye*; also a Jain temple to *Pursonath*. Gram is also defended by a fort of no strength, and of considerable antiquity: it is quadrangular, and has square towers connected with a high stone curtain and a mud parapet, the whole surrounded by a dry ditch. It occupies a slight ascent. The mica in the gneiss near Gram is sometimes replaced by talc, and passes into protogine.

My attention in this part of Mysore was often attracted by heaps of stones near the road side to which, as I have seen in Catholic countries on spots where murders have occurred, the passers-by each added a stone. From some of these, half-eaten portions of the human frame often protruded, dragged forth by the hyænas or jackals. On enquiry I found they were the remains of the cultivating caste, called the Wokeligars, who, if they happen to die of a sort of leprosy called "*Kor*" or *Thun*, are not suffered by the Brahmins to be buried below the ground in the ordinary way, "lest no rain should fall in the land"!

*Chinrayapatam*. After exploring the Corundum pits of Golushully, &c. (described in the Journal Royal Asiatic Society, No. XIV. p. 219) I passed through Kulkairy to Chinrayapatam, and thence by the Corundum localities of Appanhully and Barkenhully to Hirasaye, Cudhully, and Belloor to Ootradroog, granite, protogine, gneiss, talcose, and horn-



blende schists, penetrated occasionally by trap-dykes, constitute the formation, overlaid here and there by patches of laterite or kunkur, on which rests the surface soil. The latter is usually reddish and sandy. Sometimes these deposits are wanting, when the substratum consists of the gravelly detritus of the subjacent rocks. At Belladaira a large bed of ferruginous quartz occurs. Country bare looking.

Chinrayapatam was anciently a Hindu town of some importance, and governed by a Bellala prince. There is still a *busti* here to the 24 Pir-thunkars. The fort was greatly added to by Hyder and Tippoo; but after all is of no real strength. The Hindu sculptures in the interior are for the most part executed in the potstone of the surrounding formation. Inscription on stone, dated 1400 A. S.

*Ootradroog.* The mass of granite on which stands the Droog or fortress, is somewhat saddle-shaped, and runs nearly N. and S., it terminates abruptly at either extremity. The northern extremity, crowned by the citadel, is a sheer scarp of rock nearly 200 feet high: its base is rugged with large precipitated masses. The southern extremity is also fortified, and the two forts are connected by two walls running along and enclosing the entire length of the ridge on which stands the remains of a small village.

From the top is a fine view of the peak of Sivagunga, the highest in Mysore (4600 feet); and of the great rock of Severndroog. The granite is similar to, but less porphyritic than, that of Severndroog.

Ootradroog was stormed in 1791, by Colonel Stuart, just previous to the first siege of Seringapatam.

*Severndroog.* From Ootradroog I proceeded to Maugri, which has a handsome pettah, originally built by Kempye Goura, the founder of the fortress of Severndroog; and thence ascended the stupendous mass of granite on which stands the small pagoda and fort of Severndroog. The country for a considerable distance is wild and woody, abounding with low hills and rocks, among which a porphyritic granite prevails. The intervening vallies watered by the Arkawati and its tributaries, are in general well cultivated. A magnetic iron sand is found in the beds of almost all the rivulets, and smelting furnaces are numerous throughout this romantic tract.

The base of the great porphyritic mass of Severndroog is surrounded by tall forest trees, below which grows an underwood in which the

bamboo flourishes in great luxuriance. A deep ravine, forming a nullah bed, affords a convenient shelter for the wild beasts which infest it. Not far from the place where we crossed, I observed a capacious tiger-trap. The place has been nearly deserted since it was stormed by Lord Cornwallis in 1791, from the deadliness, it is said, of the climate; caused most probably by the decayed vegetation of the surrounding jungles. It is said that the clumps of bamboos were planted purposely to render the place as unapproachable as possible; but the bamboo, from the nature of its growth, is a tree little likely to be selected by natives for this purpose.

I ascended the rock from the north-east side. The major axis of the mass runs nearly east and west, and is crossed at right angles by a profound fissure which cleaves the rock from summit to base into two distinct portions, both fortified, so as to be independent of the lower fort, which is extremely extensive, and vulnerable at many points. After the breaching of this outer wall the garrison, panic-struck, fled to the citadel, or Bala Hissar, on the summit of the western rock, which was deemed impregnable: but the troops in the heat of the pursuit, entered the gates with them, and in one hour gained possession of the place. The assault was made from the N. E. side. Tippoo, after the peace in 1792, regained possession, and added considerably to the lower works in the construction of batteries commanding the former line of attack, one of which goes by his name; another by that of Hyder, while a third is expressively styled the *Shaitan*, or Devil, battery.

The western rock, called by natives "*Billaye*," from the light colour of its surface, which I found was caused by a species of lichen, terminates to the westward in a lofty precipice, down which many of the terrified garrison threw themselves. On it stand the ruins of Tippoo's mosque, a powder magazine, and a few other buildings.

The western rock is called *Kari*, from its dark rusty aspect, caused by the weathering of its surface, and the oxidation of the iron in its mica and hornblende. Why the whole rock should be called Subarna, or Golden, the native guides could not inform me. It is entirely composed of a granite, which from small grained may be seen passing into the large grained and porphyritic varieties. Some of the crystals of reddish felspar on Kari durga, were nearly two inches long, imbedded in small grained reddish granite.

On the rounded pinnacle of a magnificent conoidal mass of this porphyritic granite overlooking the whole rock, stands a small, but picturesque temple to Busuana.

I descended by a deep fissure in the rock to the temple at the S. E. base, where some Brahman priests and their servants still remain. Here may be traced the vestiges of the old gardens of the Poligar builder of the fort—Kempye Goura.

Along the North base are a few caves formed by the covered spaces between large granitic blocks. I regret being unable to get a specimen of the *Shin-Nai*, or red dog, which Buchanan heard was to be found in the forests of Severndroog, and which is said to kill even the tiger by fastening itself on its neck.

The *Shin-Nai*, Buchanan says, is quite distinct from the wild dog, which is said to be very common here. The forest abounds with good timber trees, most of which Buchanan describes, and among which may be enumerated the sandal-wood.

*Iron furnaces.* I have previously mentioned that a magnetic iron-sand is found in great abundance in the beds of the rivulets of this hilly tract. Furnaces for smelting it are said to exist at Hurti, Kunchakanhully, Timsunder, Naigonpully, Ittelpully, and Chicknaigpully. I visited those of Kootul, (or Cotta,) of which a description will be given hereafter. At Ghettipura, in Tippoo's time, steel is said to have been made.

*Taverikairy.* From Kootul the Arkawatty river is crossed: country undulating, and rocky; for the most part uncultivated, and jungly. The principal rock at Taverikairy is gneiss, with fragments of iron shot quartz, green actynolitic quartz, felspar, fragments of hornblende, schist, gneiss, granite, and basaltic greenstone scattered over the face of the country, and occasionally patches of kunker.

*Bannawar.* Near Bannawar I found diallage rock projecting in large, angular, scabrous blocks, from the top and sides of a low elevation. The great mass of the rock was chiefly white felspar and quartz. The crystals of diallage were well defined, and passed from dull olive-grey shades, to the lively decided green of smaragdite. There was more quartz in this diallage rock than is seen usually in the euphotides of Europe; and the external aspect of the blocks was almost trachytic in its roughness. Not far hence, the gneiss, with which the diallage is

associated, apparently as a large vein, loses its mica, which is replaced by minute silver scales of graphite.

Nodules of lateritic iron ore occur, scattered with fragments of iron shot quartz, a greenish actynolitic quartz and felspar; fragments of hornblende, schist, gneiss, granite, and basaltic greenstone, scattered over the face of the country; and occasionally patches of kunker.

*Bangalore.* Gneiss is the prevalent rock about Bangalore, penetrated by dykes of basaltic greenstone, and occasionally by granite, as is seen near the pettah, and adjacent fields. The granite in these localities splits into the usual cuboidal blocks, or exfoliates into globular masses. It often contains hornblende in addition to mica.

The gneiss strata though waving and contorted, as seen in the rock in the middle of the tank near the Dragoon barracks, have a general N. and S. direction, and often contain beds of whitish quartz preserving a similar direction. The strata are nearly vertical.

Approaching Bangalore from the west, a bed of laterite is crossed, forming a hill on which stands a small pagoda. This bed extends northerly in the direction of Nundidroog, where laterite also occurs.

In other situations, covering the gneiss and granite, a reddish loam is usually found, varying from a few inches to twenty feet in depth, containing beds of red clay used in making tiles, bricks, &c., the result evidently of the weathering of the granite, gneiss, and hornblende rocks.

*Colar.* A similar formation continues to Colar, a small fortified town, notorious for its breed of vicious horses, and for being the birth-place of the celebrated Hyder. It lies about thirty-eight miles to the E. N. E. of Bangalore. The gneiss is occasionally interstratified with beds of hornblende schist.

The hill to the N. of the village, on which stands the ruined fort of Aurungzebe's General, Cassim Khan, breaks the monotony of the surrounding table-land. A spring and a small patch of cultivated land on this eminence, probably tempted this Mahomedan noble to make it his temporary residence.

*Baitmungalum.* Granite, gneiss, and hornblende schist are the prevailing rocks. Benza was inclined to believe that the blocks of granite seen in the plain, a mile or two west of this place and north of Golcondapatnam, are erratic boulders; but, after careful examination, I am

inclined to believe they are *in situ*, or very nearly so, and are merely rounded by the process of spontaneous concentric exfoliation elsewhere described. They are outgoings of great granite veins or dykes in the gneiss.

About eight or nine miles east of this, the Mysore frontier is crossed into S. Arcot. Kunker occurs on the banks of the rivulet near the village, both on the surface and in a bed below the alluvial soil. Efflorescences of muriate of soda are also seen in the vicinity.

Baitmungalum lies on the eastern flank of the gold tract which, according to Lieut. Warren, who examined this district in 1802, extends in a N. by E. direction from the vicinity of Boodicotta to near Ramasundra. The gold is distributed in the form of small fragments and dust throughout the alluvium covering this tract.

At Marcupum, a village about twelve miles S. W. from Baitmungalum, are some old gold mines, worked by Tippoo without success. The two excavations at this place demonstrate the great thickness, in some parts, of these auriferous alluvia. They were thirty to forty-five feet deep, respectively. The following is a list of the layers cut through.

*First mine.*

1. Deep brown earth,  $1\frac{1}{2}$  ft.
2. Grey argillaceous earth with gravel.
3. Deep brown earth, (No. 1.)
4. Hard grey and yellow clay.
5. Hard whitish argillaceous earth.

*Second mine.*

1. Three feet of a black argillaceous earth with gravel.
2. Dark brown earth with stones.
3. Hard clay streaked black and yellow.
4. Hard large black stones, argillaceous.
5. Black earth with gravel.
6. Hard black clay.

The stones found in the hard whitish earth, No. 5, of the first mine, are described as of a siliceous nature, colour black, changing to a deep rust-colour where they seem to decay: a few parallel streaks, about which adheres a green and yellow substance, mark their value to the native miners.

The metalliferous stones in the second mine differ from the above, as they also differ in the matrix. They are of two kinds, viz. 1st, hard, black,

and argillaceous; and 2nd, hard, white, and siliceous. A deep orange soft substance adhering, marks their value. This substance appears, however, to be superficial, marking the surfaces into which the stone splits on being struck.

Lieut. Warren noticed that a sort of red earth, generally two feet deep, and succeeded by a white calcareous earth of equal depth, the under stratum of which consisted of large white decayed stones, seldom failed to contain an ample proportion of metal. The average proportion of gold to earth is as one grain of the former to 120 lbs. (avoirdupois) of the latter.

There can be little doubt that the auriferous black and white stones are fragments from the gneiss, granite and hornblende schist, which base this auriferous tract, and constitute the singular ridge which runs through it in a N. and S. direction, and which may be regarded as having furnished most of the materials of the reddish alluvium on its east and west flanks, and therefore as the true matrix of the gold. The orange-coloured stones I found to be caused by the oxidation of the iron in the mica.

Lieut. Warren had this alluvium washed and examined in various places throughout the gold tract, and points out as the most promising localities,—the Baterine hill and its vicinity N. of Dasseracotapilly, Corapenhully, Shapoor, Buksagur on the S. bank of the Palaur, five miles E. from Baitmungalum, Wurigaum, in a thick jungle W. of the village, which is situated about ten miles S. W. from Baitmungalum.

The process of extracting the ore from the stones is simply by pounding them, and washing the powder in water: the gold-dust sinks to the bottom. An equal proportionable quantity of gold is extracted from the powdered stones as from the earth.

The gold-dust obtained yielded on assay at the Company's mint, 94 per cent.

This auriferous range on the table-land of Mysore, may be traced to the eastern ghauts; southerly, by the hill fort of Tavuneri, to the S. of Caveripatnam mutta in the Amboor valley. Two Passes, however, break its continuity near Tavuneri.

To the N. it appears to terminate at Dasseracotapilly; though the line of elevation, taking a gentle easterly curve, may be traced by the outliers of the Baterine hills; Auminiconda or Awnee, Moolwagle, Co-

roodoomulla, Rajeegoondy, to Ramasundra in the Cuddapah collectorate, a little W. of Panganores.

*Vencatagherry.* This is the first march from the frontier into N. Arcot. The formation is similar to that of Baitmungalum; but granite (the grey variety) is more prevalent, and the quartz more impregnated with iron. Magnetic iron sand is procured and smelted in the vicinity. It is found as usual mingled with quartz sand in the beds of streams which have their rise among the hilly tracts.

*Naikenairy.* A small village, formerly under the Poligar, situated at the top of the Pass to which it gives its name, and which leads down the ghauts to the plains of the Carnatic.

Evident marks of the great disturbance and dislocation suffered by the strata are visible in the rugged physical aspect of the country to the eastward, and further confirmed in examining the sections of the rocks, whose layers are found broken, on end, vertical, and at various other degrees of inclination down to the horizontal.

The grey granite which chiefly composes the ghauts here, is a compound of white felspar, quartz, dark green mica, and hornblende. The mica is sometimes seen in round nests as large as a man's head, which in weathering fall out, leaving corresponding cavities in the rock. These are seen in the faces of some of the precipices, and impart the appearance of having been caused by cannon-shot. Iron ore, and quartz impregnated with iron, are found in considerable abundance. Veins of quartz are common, also of reddish foliated felspar, either alone or with quartz, often coloured of a lively green by actynolite. When these three minerals are combined, the structure of the mass is not unfrequently porphyritic; small cavities lined with an orange-yellow powder are seen in the red felspar, also a micaceous brilliant metallic powder first noticed by Benza, and which he seems to think is cerium, but this idea has not yet been confirmed by chemical analysis, which is a desideratum.

The descent of the ghauts here is steep and abrupt; and five miles and a half long from Naikanairy to the valley of Buttrapilly at the foot of the Pass.

The descents of the ghauts by the Mooglee Pass from Palamanair, and by that of Domaracunnama from Ryachooty, are by no means so abrupt or continuous as this: the formation is similar, but the ghaut chain is more broken.

*From the base of the Ghauts by Lalpett to Arcot.* From the base of the Ghauts by Lalpett to Arcot, the formation is similar. The bold ridge of Paliconda is chiefly of the variety of granite termed "Syenite," or a granite in which mica is replaced by hornblende, and in which usually a reddish felspar forms a prominent ingredient. Its structure in this mountain mass is both close-grained and porphyritic, and it is penetrated by several dykes of basaltic greenstone having a general N. and S. direction, but throwing off ramifications at nearly right angles. Eurite is met with in veins near the summit on which the pagoda stands. Dr. Benza appears to suppose the granite of Paliconda of posterior origin to that of the Ghauts; but as his opinion is grounded entirely on Lithological difference, and its association with eurite, basalt and porphyry, the age of which has not yet been determined, and which are moreover equally associated with the ordinary granite of S. India; we must hesitate before hastily admitting this hypothesis in absence of the other more decisive proofs of the age of Plutonic rocks derived from disturbance or non-disturbance of strata of ascertained age, with or without alteration, superposition, &c.

*Poni.* Near Poni, and Mymundeldroog a few miles to the N. E. of Vellore, granite still prevails, running in a broken chain of rocks up to Chittoor, and tilting up the hypogene schists. At Lalpett, between Poni and Arcot, is a ridge east of the Bungalow, having a S. westerly direction, and evidently an outlier of the great ghaut line of dislocation which sweeps in a curve from Naggery by Raj, and Chellempollium, to the Moogli and Sautghur Passes. The short ranges between Arcot and Vellore, those of Paliconda, Vanatedroog, and Javadie on the eastern flank of the beautiful vale of Amboor, are all equally subordinate to this line of dislocation. Through them by transverse gaps the Palaur, having traversed the longitudinal wall of Amboor, and the Poni, after having irrigated that extending from Chittoor to the N. bank of the Palaur, find their way easterly to the plains of the Carnatic.

The summit of the Lalpett ridge is crested with bare blocks of a dark massive hornblendic rock; but the great bulk of the hill is composed of gneiss penetrated by dykes of basaltic greenstone and granite, great disturbance in the strata is observable. Towards the N. extremity of the hill the gneiss is scarcely to be distinguished from the granite, except where large surfaces are exposed. The granite often passes into pegmatite. In some blocks I found the dull olive-green mica replaced



by a light-green translucent potstone, approaching *nephrite* in mineral character. This mineral also occurs in the hornblende rock in fragments, about a quarter or half an inch long, which frequently assume the rhomboidal form of felspar crystals, and give the rock the appearance of an elegant porphyry. At the exposed surfaces the softer potstone resists the action of the weather, more successfully than the harder imbedding hornblende paste, from which it stands out in relief. Blocks of it occur near the well in the tope close to the Bungalow, where it may be seen outcropping a prismatic or jointed lamellar structure. It is evidently a variety of protogine, and rare in Southern India. I recollect no published description of it.

The sections of the soil afforded by the wells here, show,

1st. Three feet of a layer of reddish brown sandy loam,

2nd. One to two feet, gravel, angular and from the ridge.

3rd. One to two feet weathered rocky detritus, and kunker occasionally.

*Caverypauk.* From Lalpett the road lies by the populous town of Wallajah-nugger, on the North bank of the Palaur to the Caverypauk. The ghaut elevations, and their subordinates, have now been left behind, and the plains of the Carnatic are in front varied only by a few low hills near Wallajah-nugger. Near Caverypauk the fine white kaolinic earth, decayed pegmatite, of which many of the Arcot goglets are made, is dug.

*Sri Permatoor.* After a day's examination of the temples and sculptures at Conjeveram, I reached this birth-place of the celebrated Brahman *Guru*, and founder of the Sri Vaishnavam sect,—Rama Anuja Achari,—who is supposed to have flourished in the eleventh century of the Christian era, and converted many of the Buddhists and Jains, who then constituted the mass of the population, to the Brahmanical faith.

At Conjeveram, I was waited on by a number of Brahmans of the Smartal sect, whose Guru is Sencra Achari, priests of the great temple to Siva there. They complained much of the higher amount allowed to the great temple of the Sri Vaishnavam, at Little Conjeveram, viz. 12,000 rupees per annum, while that to their own chief is only 2,000. This difference they say originated in the partiality shown for the Sri Vaishnavam sect by the Hindu minister of the then Nuwab of the

Carnatic, the famous Wallajah. The other sects of Brahmans prevailing here are the Telinghi, Madual, and Shaivum; and it is calculated that Conjeveram contains nearly a thousand families of Brahmans of the above five sects. Remnants of the old Jain temples are traceable in fanes now occupied by their fierce Brahmanical persecutors; and there is still one family of this sect living at Conjeveram, and a small *busti* or temple at Tripetty Goodum, a neighbouring village.

In the erection of the temples, the Hindu architects like the Egyptians, in the N. and S. disposition of their walls, appear to have gone by the polar star or the rising and setting of the sun, rather than by the magnetic meridian. In their tanks near the place I observed both the sacred lotus or Tamari (*Nymphæa Nelumbo*,) and the smaller lotus, (*Nymphæa lotus*) called by Tamuls, "*Alli*," with its flower of the richest and deepest pink, studding the surface of the clear water which is often completely carpeted with its broad peltate serrated leaves. The seed of this aquatic plant is eaten, and also its root.

Much of the grey granite used for the foundation and lower parts of the *Gopars*, *Vimanas*, and walls of the temples is, I am told, brought from the rocks of Sholingur, about twenty-five miles to the west by north, and from Tirvaloor.

Some large blocks of a bottle-green hornblendic rock, resembling that of the Palaveram hill, were brought from Pattamully coopum.

Astronomy, for which the Brahmans of Conjeveram and Trivaloor were once so famous, is now at a low ebb. The Joshi of Great Conjeveram is a Telinghi Brahman, named Yaikambria, who adopts the tables of the *Chandra Siddhanta* of Anáwa Ayenga, a Sri-Vaishnavam Brahman of Little Conjeveram; but the most celebrated Joshi lives at Caverypauk; he is a Brahman of the Smartal sect, named Rama Joshi. They calculate the movements of the heavenly bodies and eclipses for each year; the lucky and unlucky moments; and draw out written annual almanacs. But their principal occupation is astrology, calculating of nativities, horoscopes, &c.

*Sri Permatoor.* The plain around Sri Permatoor, as at Conjeveram, undulates slightly; and gradually inclines towards the sea coast, which is about twenty-seven miles to the eastward. The lower grounds are occupied by tanks, some of them of great size, as is the wet cultivation

they irrigate. The tank of Sri Permatoor is said to water 25,000 acres, chiefly rice-fields yielding two annual crops.

The higher grounds are often uncultivated, and covered with low bushes, chiefly of the dwarf date, (*Elate sylvestris*); the thorny *carais*, (*Webera tetrandra*); the fragrant Kellacheri; and the prickly pear, over which tower the stately fan-palm and cocoanut.

This maritime province of Chingleput, or "the Jaghire," the first ceded to us in S. India (A. D. 1763 by Nuwab Wallajah) has an area of 2253 miles; a revenue (chiefly derived from its wet cultivation, and the duties on salt manufactured on the coast) of nearly fifteen lacs of rupees, and a population of about 108 to the square mile.

The surface soil in the vicinity of Sri Permatoor is a sandy, reddish loam, overlying either thin beds of a loose coarse sandstone passing into white and ferruginous shales, laterite or kunker mixed with sand, or "*chikní muttí*," a tough greyish marl imbedding fragments of granite rocks, chiefly felspar. In digging for water near the village, the following is a list of the layers usually cut through.

1st. Reddish sandy loam, .. .. .	5 feet.
2nd. Angular granitic gravel, granitic or lateritic, } mingled with kunker, .. .. . }	3 "
3rd. Chikní muttí, .. .. .	4 "
4th. Loose sandstone, .. .. .	4 "
5th. Sand, .. .. .	2 "
	<hr/> 18 feet.

At Conjeveram the wells are much shallower, the bed of sand in which the water is found lies under similar layers of loam and *chikní muttí*, on an impervious bed of rock or clay. The Wudras tell me, there, that they never have occasion to dig down to the rock.

On the hard surface of the plain at Sri Permatoor are found, near the Traveller's bungalow, a few fragments of a hornblende rock resembling that of Palaveram, pegmatite, grey granite, a ferruginous hornblendic rock, white and reddish shales with edges little worn, together with a few scattered pebbles, well rounded, of a compact reddish sandstone or quartz rock, exactly resembling that of the Naggery hills,

about fifty miles N. of this. It is very evident, from their rolled aspect, that these hard quartz pebbles have travelled, and been subjected to the action of water in motion; but whether they have been washed direct from the parent rock to the place we now see them in, or whether they were once imbedded in deposits of laterite on, or near the spot, and which have since been swept off, is uncertain. A little farther to the westward of the bungalow, the surface of the plain is strewn with the harder debris of a bed of laterite, a circumstance in favour of the latter hypothesis, and among which are rolled fragments of a chocolate sandstone, exactly resembling those found by my friend, Cole, in the laterite of the Red hills. Rounded pebbles of white and red ferruginous quartz are also scattered on the surface, and beds of a fine light-coloured sand, like that of the Egyptian desert, and evidently not the result of the disintegration of rocks in situ. In short, there is every appearance of this part of the Carnatic having emerged at no distant geological period from beneath the surface of the water.

From the little worn aspect of the fragments of the granitic rocks, and the softer shales, it is evident that these rocks are at no great distance hence in situ: accordingly I continued my search in the plain to the westward, and at length succeeded in finding the white shale in situ in the bed of a small stream which feeds the tank, and on its banks a light grey sandstone outcropping in the bed of a small pool; both rocks in horizontal strata, the sandstone overlying the shale. The sandstone is rather coarse or granular in structure, being composed of angular grains of greyish quartz held together by a white felspathic paste. In some excavations a little to the east of the bungalow, it passes both into a conglomerate imbedding small rounded pebbles of white quartz, and into a ferruginous sandstone resembling that imbedding silicified wood near Pondicherry. This sandstone, like the laterite with which it is associated, has evidently been broken through, and stripped off in many places by aqueous denudation, its strata being by no means thick or continuous.

It is found in the plain between Madras and Naggerly in a more consolidated and compact form, and has been judiciously employed on account of its containing but little or no iron, by Lieut. Ludlow, in the construction of stands for the instruments in the Magnetic Observatory

of Madras. Its locality, according to native information, is about six miles and a half, E. by S. from Tripassore, a little N. of the Madras road, near the village of Permaul Naigpet. It here imbeds ferruginous reniform nodules, and a few pebbles of the older sandstone of Naggery, and makes an excellent building stone. Like the laterite, it is usually found occupying the higher parts of the undulations which traverse the plains of the Carnatic, in lines running parallel with the eastern ghaut chain, of which great dislocation they probably mark subordinate, synchronous elevatory forces. They are interrupted, usually, by transverse vallies, through which the great lines of drainage from the table-lands pass off to the sea.

I was unable to find the granite and hornblende rock in situ, but I have little doubt that they are to be found basing the plain.

Concretionary sandstone sometimes occurs in the loam and silt overlying the sandstone.

A little to the eastward of the bund of the tank is a bed of laterite similar to that of the Red hills, the extent of which I had not leisure to trace. It is used for making roads.

*Poonamalee.* Between Sri Permatoor and Poonamalee, north of the large Chumbrumbancum tank, a bed of laterite runs to the northward of the road, which in structure resembles that of the Red hills, and another is crossed, or a spur of this, shortly afterwards.

A third bed is seen between Poonamalee and Madras, near Nabob's Choultry. They afford good material for making and repairing the road, which has been taken advantage of. The laterite enters into the construction of the fort at Poonamalee and St. Mary's Church at Madras; the base of the pedestal supporting the Munro Statue, the construction of the public roads, &c.

At Madras the soil is sandy, overlying beds of a bluish-black clay interstratified with layers of sand and reddish clay, and occasionally a bed of angular granitic gravel. The whole rests on the solid granite rock.

*Account (Part II.) of parts of the Cabool and Peshawar Territories, and of Samah, Sudoom, Bunher, Swah, Deer and Bajour, visited by Mulla Aleem-ulla of Peshawar, in the latter part of the year 1837. Arranged and translated by MAJOR R. LEECH, C.B. Late Political Agent, Candahar, under whose instructions the Tour was made.*

“Moorcroft, Vigne, Burnes, Masson, Leech, and Wood, had travelled in the country, yet when General Pollock was at Peshawar and the Khyber closed, there was no trustworthy information to be procured regarding the Karifa, (Karapah?) the Abkhánah or the Tirah routes from Peshawar to Jelalabad.”—(Recent History of the Panjab, from the *Calcutta Review* for September 1844.)

“Of the Kohistan (Eesafzai), my information is, I must confess, very imperfect, and will be here limited to nearly a barren detail of names.”—(Captain E. Conolly, *Asiatic Society's Journal*, No. 105, 1840, page 929.)

“The much-to-be-regretted death of Doctor Henderson, has deprived us of authentic geographical knowledge respecting the valley of Suhát, Bonler, the valley of the Deer river, and the country of Bajáwar.”—(Vigne's *Cashmeer*, Vol. II. page 310, 1842.)

The author of the Recent History of the Panjab has gone considerably out of his way (even to the Haft kotal) to prove that every traveller across the Indus has failed both in his duty to his Government and to the geographical public, and seems to forget that a London publisher is not always the person to whom a Government servant should send surveys of Military Passes.

In justice to the late Cabool Misson of 1836-38, (two of whose members, Burnes and Lord, are dead, and a third, Wood, has retired from the service), I feel it a duty to record that before the advance of the Army into Affghanistan, Government was by the members of the Mission put in possession of surveys (made on horse and camel back) of the Khyber and Bolan Passes, and of that leading from Cabool viâ Bamian into Turkistan, and of accounts of all the other Passes leading from the Indus into Balochistan and Affghanistan, as well as of those leading from Cabool into Turkistan over the Hindoo Coosh. If the author of

the Recent History will refer to the published (not in Albemarle street) account of the Khyber Pass, dated Cabool, 1st October 1837, he will find the description of the three Passes of Tátára, Karapah, and Abkhánah thus prefaced:—"There are three other Passes, which are connected with this one (the Khyber), in as much as a simultaneous passage would most likely be attempted by an invading force through more than one."

The author of the Recent History also blames the natives of the country for calling the Pass, Haft kotal, and blames all Europeans for copying them.

While Darrah is a word applied both to a valley (Shahar Darrah, Shah Darrah), and to a defile (Darrah i Khyber, Darrah i Bolan), the word Kotal is applied to a ridge either rising from the plain or to the surmounting ridge of a Pass; and the Pass that puzzled the wide-awake author of the Recent History, the "Daylight Traveller," to account for its name, is called Haft kotal, or seven ridges.

It is a pity, however, that the natives were not taught by our Recent Panjab authority to call it Haft kotalak, and that Europeans were not taught to translate it the seven paslets, and this new-coined word might be entered in the dictionaries in which Kotal is not to be found opposite to Kotalak.

The word for a ridge must not be confused with the one for a spare horse led in state before a chief. I hope the author of the Recent History of the Panjab will next give us the Recent History of the Protected Sikh States, and in the Preface parody the above quotation thus—

" \* \* , \* \* , \* \* , \* \* , \* \* , and \* \*

had travelled in the country, yet when the British attacking force was at Thanesir, and the insurgents in Kythul, no information regarding the fort was to be procured."

I was only three days in Peshawar in 1837, and was never again in that neighbourhood until with General Nott's force in 1842.

From Dacca to Peshawar there are four roads; the Khyber, Abkhánah, Karapah, and Tatara.

Dacca contains 100 houses of Momand Afghans, of the clans Alamzai, Morcha-khel, and Moosázai, who act as guards to travellers and kafilas, who without them are sure to be plundered.

No revenue is received from these people ; on the contrary, they were always paid by the rulers of Cabool for keeping the above roads open, which they shut immediately their pay was stopt or kept in arrears.

Their charge for protection is,

On every horseman, or horse load, .. .. .	2/3 rupees.
On every camel load, or pair of kajawahs, .. .. .	3/3 ditto.
On every foot passenger, .. .. .	2/3 ditto.

Their chief is Sa'ádat khan, who has command of three of the roads, Tahtarah, Abkhánah, and Karapah, as well as the river route by raft from Jelalabad to Peshawar. He lives at Sulpoor on the other side (from Dacca) of the river. He is in the employ of the rulers on a salary of 12,000 rupees, and the Momands on the above roads, estimated at 45,000, acknowledge him as chief.

On every traveller by raft, one rupee is levied. The roads on this (the south) side of the river, which flows from west (Cabool) to east (Peshawar), are hilly, having many ascents and descents.

The road to Peshawar called Karapah, on the other side of the river, is also hilly and difficult, but not so much so as the others, it being possible, with management, to get guns over it. They have now stopped it up.

The other two roads, Abkhanah and Tahtarah, are safe.

The Khyber road is that for artillery and armies, but the Khyberies are great robbers, and often render a passage by it unavailable. Their word is not to be depended on. They are said to amount to 35,000 matchlock men. There are few habitations on the road, and even off the road they (the Afreedees) live a good deal in caves.

Their chief is Khan Bahadur, by clan a Malik Deen-khel. He and Saleem khan Jopa command 8,000. Abdul Kadar khan, Maddat khan and Alladad khan, Zakha-khels, command 10,000.

The Kukee-khels are 12,000. The Kumbar-khels 10,000. Alam khan Orakzai commands 10,000. The Shanwarees are 6,000. All these have their share in the Khyber.

Other portions of these tribes reside at Barah and Teerah, but they all have a share of the pay allowed by the rulers, and of the collections on the road at the tolls, and for Bodrakahs or guards, and all take their turn of service in the Pass.



From Dacca to Jamrood is in all 24 kos.\*

From Dacca to Huft Chah (7 wells) is 4 kos; these were sunk it is said by a Cafer king of old, named Bagram, for the convenience of travellers. In those days the land around them, it is said, was cultivated. Their depth has never been ascertained. They are situated on the high road, four to the East and three to the West of it. The place is infested by thieves, and there is no water or habitations.

The Khyber Pass is a defile between hills, the eastern one belonging to the Shanwarees. The road runs from North to South. From Huft Chah to this Kotal of Sande khánah, is six kos. Below the Kotal (pass) immediately on the road a little to the South, on the skirt of the hill near a ravine, there is a spring of water of one mill strength, flowing from East to West; to the West there is a very high hill on which is a fort of the above named Cafar king, said to have been destroyed by Hazrat Alle, who defeated him, and opened the Khyber. It is now in ruins; there is a little cultivation here, which is a Caffila and army stage. It is on the boundary of the Zakha khel, and Thanwareeg.

There are two roads up the hill, one to the East below the brow, having four windings and ascents and descents three kos in extent; the other by the stream along a ridge, two windings and ascents and descents one kos in extent, not a gun road. On reaching the top the road is again level to Gurheelalbeg, which is four kos and a stage. There are twelve small square forts, having each a lofty tower and eight guz high many of which are hostile to each other. It is the boundary of the Zakha khel. There are 1500 matchlock men in these forts. There is cultivation round the forts, but the inhabitants gain their livelihood by robbing on the highway.

Even when royal armies paid for their passage, the advance and rear baggage generally suffered.

The Khyberee mothers are said to accustom their children from the age of five to six years to steal, beginning with neighbour's fowls, their spinning wheels and other household utensils, stinting them in food the days they are not successful. Sayuds, Molvees and Fakeers are not respected by them, and in stripping them, they jokingly say they intend to hang up their clothes as holy relics in their houses.

\* The details are in kachab, or short kos.

From Gurheelalbeg to Alle Musjid, which is in the centre of the Pass, is four kos in a defile, the road is level and a stream runs in it.

Two kos from Gurheelalbeg towards Alle Musjid, from the hills to the West of the road, a spring of water of seven mill strength gushes out, and flows along the high road to the south.

In the Darah, there are Zaitoon, Baloot and other jungal trees. From this spring one short (kachah) kos further, the Pass contracts, and is covered with large stones, the water flowing over them; over and through which people get their beasts of burden with difficulty, and it is not even pleasant for horsemen. This place is reckoned the exact centre of the Khyber. From this gorge to the fort of Alle Musjid is one kos.

It is situated on a high hill, and was of old there. Dost Mahammud Khan, has rebuilt it for the protection of travellers, and for fear of the Sikhs, and garrisoned it with 100 men. It is very difficult of approach, and is situated on the hill that rises from the west of the road. There is a little level ground to the east. The fort was built originally by the kings of old, more it is said as a toll.

From Alle Musjid to Jabagai is three kos, a halting place, but no habitations. From Jabakee (also called) there are two roads. One to the south, called the Dahan-i-Darrah (mouth of Pass) road, to which entrance it is four kos, level and winding, abounding with canes and rushes, having a running stream. After leaving the Pass and entering the plain, there is a village of Khaleels named Jangoo.

The second road from Jabakee to the east is over hills known as the Shadee and Bagyaree road; it is winding, and the distance to Jamrood is four kos, in which there are three Kotals. Jamrood is the name of a village at which the Khyberees used to collect tolls, and give guards. One and a half kos after leaving the Pass there is a rising ground, on which Ranjeet Singh has built a new fort. From Jamrood to Peshawar is five kos to the east over a plain.

I give my Meerza's (he was so from 1838 to 1842) account of the Khyber, that from it judgment may be formed of the scrutiny with which he prosecuted enquiries.

The third road from Dacca to Peshawar is the Taktarah one, twenty kos in extent, very difficult, (the details are in kachah or short kos.) From Dacca to the east, three kos, is Kongah, having the river to the

north, and hills to the south. It contains 230 houses of Momands of the clan of Alamzai and Marchah khel, under Saadat Khan, and three Hindoo shops. From this village guards are procured, their chief is Daeem.

The rates for guards are,

A camel load or pair of Kajawahs,	..	$3\frac{2}{3}$	rupees.
A yaboo load or horseman,	.. .. .	$2\frac{2}{3}$	„
A bullock or ass load,	.. .. .	$1\frac{2}{3}$	„
A foot passenger,	.. .. .	$\frac{2}{3}$	„

The guards are of the clans of Shanwarees and Afreedes, who with Momands and Balagoorees hold the road.

The chief of the Shanwarees is Rahmat Khan; those of the Balagoorees are Ahmad Khan, Rahat Khan, Afzal Khan and Shahnawaz Khan, Shamsodeen Khan, and Shahabudeen Khan. The Shamsarees amount to 8,000, the Balagoorees to 8,000, and the Momands to 4,000. They live in difficult parts of the mountains. They are by occupation guards and muleteers, many mules being produced in their country. Half a kos after leaving Kongah there is an ascent of one and a half kos, and after it a second; when both are surmounted, a plain is entered of four kos extent, on which off the road are twelve forts of Momands. There is a well on the road not bricked, is finished with masonry for the use of travellers.

From this well there are two roads; one to the south-west is the Rahtarah, and the one direct in front to the south, is the Abkhanah one.

On the Rahtarah road, three kos from the well, are two forts, which is the first stage from Dacca.

From these forts the road for ten kos is in a defile having a running stream, and plenty of trees, but no habitation. The stage is at the foot of a hill.

On leaving this a hill is ascended called the Koh-i-Khuda (hill of God) for seven kos. After which is a second hill called Koh-i-Rusool, (hill of the Prophet) having an ascent of six kos, and descent. It is also called the Tahtarah hill. There are other five lesser hills to surmount, having ascents and descents of three and four kos. There are no habitations on the road, but after descending each hill a small

stream is met, sufficient for drinking purposes. The Shanwarees and Balagoorees are here mixed.

For the next four kos the road is very difficult, over ascents and descents to the Darrah of the Balagoorees; after passing through which the village of Isportang, belonging to the Barozai Khaleels, on the plain of Peshawar, is reached.

The Abkhanah route from the well where the Tahtarah road branches of, is as follows :

One kos to the south from the well there is a Kotal to be ascended, after which for one and a half kos, there is a plain and then a second Kotal one kos to descend. At the bottom the Cabool river runs, and this is a stage; the ferry is called Guzar-i-Guttah, there is a small plain but no habitations, the inhabitants having their dwellings and shops in the hills above, for the accommodation of travellers by raft. On a Caffila arriving, these people descend and prepare rafts of inflated bullock hides to cross the Caffila, if they have Badrakahs or guards with them. It is impossible to cross the river but by raft, and as the stream is confined by high overhanging hills, it is very difficult to proceed along the bank over them, either backwards or forwards, a camel not being able to go. The stage belongs to the Momands under Saadat Khan. On crossing the river there is no open space, and a halt is made among the rocks on the river side, of only sufficient duration to reload the beasts of burden.

The road then for four kos, is an ascent up the brow of hills, without water or habitations, much infested by thieves.

Then the village of Hyder Khanee is reached, which is surrounded on all sides by hills. The inhabitants live in mat huts, which amount to 100, and there are 200 matchlock men; this is a stage.

Thence the next five kos are over ascents and descents; Zaitoon and Baloot trees are plentiful, as well as the matting grass; the occupation of the inhabitants is mat-making, men and women. They do not wear leathern shoes, but grass sandals, which they wear in and out of doors, on the hills and in the plains; they are called Chaplee or Psaplai.

Thence five kos the road is hilly, having ascents and descents to Michnee, which is situated below hills, on the river, which is to the south. There are two villages furnishing 700 matchlock men. The

names of their Maliks are Buland, Rustum Khan, and Rahmut Khan, Moorchuh khel Momands under Saadat Khan. Although on the river side, their lands depend on the rain, being elevated. The inhabitants' occupations are guards and grain merchants, carriers, and mat-making. On the other side of the river are the Buzazai Khaled Affghans dependent on Peshawar.

The river is crossed on rafts, the charge for a load being  $\frac{2}{3}$  rupees, for a foot passenger  $\frac{1}{12}$  rupee, for a bullock or ass  $\frac{1}{6}$  rupee. The Badrakahs from Peshawar toward Cabool charge as follows :

A horseman,	..	..	..	..	..	2 $\frac{1}{3}$	rupees.
A yaboo or mule load,	...	..	..	...	...	2 $\frac{2}{3}$	„
A bullock or ass,	..	..	..	..	...	1 $\frac{2}{3}$	„
Foot traveller,	..	...	..	..	..	$\frac{1}{3}$	„

The Badrakahs pay for crossing the rivers.

The fourth, or Karapah road, is as follows :

From Dacca the Cabool river is crossed by boat to Lalpoor, a large village, containing 3000 houses and 120 shops. Saadat Khan resides here. The distance by this road to Peshawar from Lalpoor is twenty-eight kos.

From Lalpoor to the north, at three kos, there is a Kotal called Khurpash, which is a winding ascent for four kos. It may be practicable for armies and guns. The next seven kos, to the stage, is level, which is called Murdar Dand ; no habitations.

The next stage is eight kos, to Gandawah, also called Gandaw.

The road then goes eastward eight kos to Shabkadar, a village of the Duabah of Peshawar.

Between Murdar Dand and Gandawah, there are two small Kotals, and from the latter place to the mouth of the defile, there are two Kotals, one large and one small, and others besides. In the large Kotal there are capacious caves, in which merchants and travellers spend the night. The road of Karapah is held by the Alamzai Momands, under Turbaz Khan, the son of Mazulla Khan, a relation of Saadat Khan's, and chief of 24,000 men.

Of these four roads, I (Alle Mulla) travelled by the Abkhanah, to Peshawar.

From a Dufter at Peshawar, I procured the following estimate of the area of the different dependent pergannahs :

Total No. of Jarebs.			
Yoosafzai, ... ..	1,25,000		
Mandad, .. ..	1,00,000		
Jagharzai, .. ..	22,000		
Bajour, .. ...	1,25,000		
Bunker, .. ..	22,000		
	3,94,000	Uncultivated.	Cultivated.
		1,34,700	2,59,300
Tarah and Bangash, ... ..	98,500	38,300	60,200
Orakzai and Bangash-i-Pay-			
ans, .. ..	98,000	48,000	50,000
Dahman and Banoo, .. ..	98,300	48,300	50,000
Khosh and Marwah, .. ..	98,000	48,000	50,000
Khattaks Balla and Hayan, ..	1,90,000	40,000	1,50,000
Wazeerees, .. ..	3,00,059	1,00,050	2,00,000
Torees and Jajeas, .. ...	1,60,000	60,000	1,00,000
Suburbs (Ahaf) of Peshawar, ..	3,90,000		
Mohmands, .. ..	80,000		
Khaleels, .. ..	80,000	44,300	35,700
Daoodzais, .. ..	70,000	30,000	40,000
Khalsah, .. ..	70,000	35,000	35,000
Duabah, .. ..	70,000	30,000	40,000
Hashtnagar, .. ..	40,000	18,000	22,000
Gardens of Kashbah Bagram			
and Shake Mahal, .. ..	40,000	7,000	33,000

Peshawar, by another account I procured, is said to have a revenue of 9,15,300 rupees, derived from 3,24,000 Jarebs, divided into 7 Pergunnahs. Pergunnah 1st.—The Khaleels 25,000 houses in 41 villages, yielding a revenue of 1,05,000 rupees from 70,000 Jarebs. The chiefs being Arbab Janea Khan, Sadmast Khan, and Arbab Zaeed Khan, Miuhee Khel Khaleel.

Pergunnah 2nd.—The Momands 38,000 houses in 55 villages, containing 84,000 Jarebs, under Ghazeedeen Khan, Kareem Khan, and Mahommed Khan, paying a revenue of 1,60,000 rupees.

Pergunnah 3rd.—The Duabah 25,000 houses in 5 villages, containing 70,000 Jarebs, under Arbah Abdulla Khan, Gagynnee Mandezei Khaleel and Arbab Hamza Khan and Arbab Sikandar Khan, paying a revenue of 1,50,000.

Pergunnah 4th.—Hashtnagur, 22 villages, 25,000 houses, 40,000 Jarebs, under Izzat Khan and Shahnawaz Khan Malmandzai, paying a revenue of 90,000 rupees.

Pergunnah 5th.—Daoodzais, 70,000 Jarebs, 20,000 houses, under Arbab Saadut Khan and Shahpasand Khan and Ahmad Khan ; revenue 1,03,000 rupees.

Pergunnah 6th.—Shahee Mahal round the town, is applied to the cultivation in the old royal gardens ; the Kasbah of Bagram contains 40,000 Jarebs, and pays a revenue of 50,000 rupees.

Pergunnah 7th.—The Khataks, revenue 1,50,000, under son of Abbas Khan and Ameer Khan, 70,000 houses in 67 villages.

There is a Tappah also, called Khalsah, that the kings of old did not include in their revenue, but set apart for their household expenses. The Barakzais collect, it is said, 56,000 rupees from it.

There is also the Sayer of Peshawar, called kacheree, which produces 1,25,000 ; another Pergunnah of Peshawar is the Eesafzais to the North, 130 villages and 2,25,000 Jarebs.

This tribe inhabiting Swat, Bunher, and Sama are estimated, or rather were, at 9,00,000 spearmen and matchlock men. I have heard from old and respectable and well informed men of this tribe in Bunher, that Ameer Khan, their progenitor, had one son, Eesaf, who again had three sons and one daughter, Mandad, Malee, and Ako, and that the Malezais and Mandadzais inhabit Bunher, and the Akozais Swat, and the Tarkareen, called after the daughter of that name, inhabit Bajour.

That the Mandad and Razad clans of Mandezeis inhabit the Sama (level) and have 69 villages, and musters 2,28,000 matchlock men, horse and foot, (2,09,000 foot, 19,000 horse,) and have 1,92,000 Jarebs of land. Should a powerful Government ever arise, 14,00,000 rupees might be collected.

The Malezais and Mandzais are in Bunher, having 70 villages and 1,00,000 matchlock men. It lies north of Sama, (93,000 foot, 7,000 horse.) They have 50,000 Jarebs of land.

The Akozais inhabit Deer and Swat, mustering 1,95,000 matchlock men, (1,48,000 foot and 47,000 horse.)

Deer and Swat contain 83,000 Jarebs. It is said that the whole of the Eesafzais matchlock men are estimated on the Hujrah. Each Hujrah contains 13 rebs, and each reb 19 zeer, each zeer 12 bakh-rahs, (shares) and each share 9 keelbahs, and to each keelbah 60 seers seed, and for every seer seed one Jareb, and every share furnished six matchlock men, foot or horse.

The Eesafzais have another custom, that of changing their villages and lands every two or three years.

Another Pergunnah is that of Bajour, inhabited by the descendants of Tackareen, and contains 1,25,000 Jarebs. The kings of old collected 1,40,000 rupees, they are now independent. The chief is Meer Alum Khan, who has thirteen guns, and seventy Shakuns, and 2,000 Jazaeels of Zattulla Khan's time. This Zattulla Khan is said to have been a Loddee, left by Aurangzeb as Governor of Peshawar, and to have made 12,000 of these long pieces, for taking effect on the Teerachs and Khyber robbers on their heights, of  $2\frac{1}{2}$  gaz in length; these Jazaeels are called after him.

Bajour of old depends on Peshawar, from which it is N. W. It has to the north the Cafers,\* with whom constant war is waged.

Another Pergunnah is Cuner, containing 46,000 Jarebs, which paid 34,000 rupees to the kings of old. Ahmad Shah Duranne gave it to Sayad Hajeesh, whose sons are the present chiefs, one named Sayad-wodeen; 20,000 matchlock men can turn out, (3,000 horse and 17,000 foot.)

No revenue was taken by the Sadozyes; Mahummad Azeem Khan, from Jalalabad, attacked Sayad Hajeesh, and making him prisoner, fixed the revenue of his country at 30,000 rupees. A further account of Cuner is contained in Part I. of this account.

The following is a more detailed account of the Duabah, which is inhabited by Zagyanees, under Arbab Abdulla Khan, and Sikandar Khan, sons of Hamza Khan, son of Ashraf Khan, of Shah Kadar.

They formerly received 4,000 rupees pay from the kings, and furnished 800 cavalry and 8,000 infantry. There are 48 villages in the Duab, containing 6,640 houses, and paying a revenue yearly of Rs. 1,21,310.

\* (Siyah-Pósh.)—EDS.



I also gained the following particulars of Hashtnagar. It contains twenty villages, and 40,000 jarebs. The revenue is 95,000 rupees. The ruler is Sayud Mahammad Khan, brother of Sultan Mahammad Khan. He has a body of 700 cavalry, and 400 foot. The villages are as follow:—

Noushera, ..	6000	Rs. under Mulla Ghulam Kadir, 3000 Jarebs.	
Dheree, .. ..	1000	.. .. .	80 „
Kheskhee, ..	6000	.. .. .	300 „
Nisata, .. ..	1000	.. .. .	70 „
Padang, .. ..	6000	.. .. .	200 „
Bhabda, .. ..	6000	.. .. .	2000 „
Charsada, ..	9000	.. .. .	2000 „
Gudee Bayáz Nu-			
jan, .. ..	2000	} .. .. .	400 „
Gudee Hamud			
Gul, .. ..	700	} .. .. .	100 „
Gudee Kaka khel, 800		.. .. .	150 „
Jum Darasha			
Nujan, .. ..	800	} .. .. .	150 „
Razad, .. ..	2000	.. .. .	300 „
Oosmanzai, ..	6000	.. .. .	2000 „
Omarzai, .. ..	4000	.. .. .	2000 „
Sherzai, .. ..	6000	.. .. .	3000 „
Gudee Bunda			
Nujan khel, 1000		} .. .. .	200 „
Tangee, ..	12,000	.. .. .	6000 „

under Malahs Dost Mahammad and Afzal Khan.

The fort of Hashtnagar has two gates and two guns.

From Peshawar eastward, I proceeded twenty-four kos to Deree on the other side of the Sandye river, included in the pergannah of Hashtnagar, inhabited by Mahammadzais. The former chiefs were Meer Baz Khan and Shahnowaz Khan; the present are Meer Ahmad Khan, the son of Zardad Khan Bamezye, on the part of Sayad Mahammad Khan. The revenue is 1000 rupees, there are 700 jarebs dependent on the rain, and 200 jarebs watered by six wells. The river water is not available for cultivation. There are 200 houses

and four Hindoo shops, seventy footmen and ten horsemen. There is a ferry boat on the river, used by merchants who trade between the Eesafzais and Peshawar. Two crops a year are produced of wheat, barley, Indian corn, and cotton. The inhabitants are at enmity with the Eesafzais regarding the pasturage of their herds on the plain to the east. The river is to the west of the village in which there is an island on which cattle are grazed.

Three kos to the south is the village of Kheshekee, which is on the river also, having a ferry boat. There are two kandees, one called Bur kandee of Shekhs and Nujan khels, and the other kandee of Panchtana. The former has 600 houses, under Nujan Afzal and Nujan Ahmad Kheshekee. Panjtana has 1,700 houses and twenty-five shops of Hindoos. Both hamlets could furnish 300 matchlockmen, (260 foot and 40 horse.) It was formerly under Shahnawaz Khan Mahammadzai.

Between the two kandees there is an earthen mound on which are Cafer ruins. Across the river to the west there is a bela, (island) on which cattle are grazed. The river water is not available for cultivation. There are seventy wells in the village. The revenue is 6,000 rupees included in Hoshtnagar. To the N. E. there is a plain called Merá, on which the plant called, in Persian Ushlan, and in Pushtoo Sanari, which is burnt for ishkhari (potash,) which is exported in thousands of kharwars by Khattak and Ormar merchants. It gives a greater return for labour than cultivation of grain. The inhabitants have 1000 cows, 700 buffaloes, 4000 sheep, and many asses, and are chiefly traders. They were at enmity formerly with the men of Noushera and the Eesafzais, *i. e.* before Runjeet Singh subdued the country.

It is three kos from Kheshekee to Noushera south-east. The chief was formerly Shahnawáz Khan, son of Faiztalah Khan; now Runjeet Singh has given it to Sardar Saiyad Mahammad Khan. The headman is Mulla Ghulam Kadur, the Sardar's Naib. Its revenue is 6000 rupees. There are 6000 houses, and 120 of Hindoos, and 200 shops, and 1000 matchlock men. The Parachahs are chiefly traders. The river is to the west of the village. There is a ferry boat.

'Round Noushera there are 1000 jarebs of watered land, and 200 wells.

To the north of Noushera there is a hill called Tarkai, on which are the remains of Cafer buildings, and to the east there is a rising ground. Shahr-i-Safa, known as Shahr-i-Sabbak, on which are also Cafer remains, but no towers or minarets.

Below the skirt of the hill to the N. E. of the river are some houses of Afghans. There is another rising ground to the east, called Zadah Nujanah, and also the hill of A'dam and Durkhanee; the shrine of these lovers being below the hill on the south side, where there are also seventy houses of Afghans, and these two hillocks are near each other on the river between Noushera and Acora.

Across the river to the west there is another village also called Noushera, on the road newly built by Runjeet Singh, as is the fort. It was ruined by former rulers and by robbers. There are 200 houses a bazar, and a mandee.

I learnt that one Abdu Rahman, son of Imamudeen Parachah, a resident of Noushahrah, found a vessel of old gold coins on the neighbouring hill, and that on its becoming known, he suddenly decamped at night with his family to Kuram, in the vicinity of Bungash.

Leaving Noushahrah to the south, and passing the above hill, I entered the plain of the Eesafzais; the road leads through a defile in the hill called Tarkai, with difficulty passable to guns.

Two kos from Tarkai in the plain is a tank called Ateeh, and beyond it one kos, on the river bank, there is a road over an eminence on which are remains of Cafer buildings; and three kos further is another eminence called Dakhla, also having ruins on it. Two kos further is an eminence called Taree, also crowned with ruins, as well as with scattered houses of Affghans.

Two kos further on, there is a lofty eminence called Baba Deree, on which there is a square fort, built by Malik Daleel khan.

There are 700 houses of Eesafzais, and four wells and several young mulberry trees. The inhabitants are chiefly herdsmen: they are on good terms with Daleel khan, son of Jalal khan of Taroo, and at enmity with Ahmad khan, son of Lashkaree khan, of Hootee.

Half kos further on is the village of Toroo, and before reaching it is Kacho Daree, on which there are also Cafer remains.

There is a stream called Kalpanee, running from north to south through the village of Toroo, on which there are water wheels. Most

of the Mandad Eesafzais get their drinking water from this stream, which is fed from a spring. It has great capabilities, which might be brought to account by a powerful government. It is not much used by the tribes on account of their internal feuds. The villages immediately on its banks cultivate vegetables, Indian corn, and a little sugar-cane.

The reason that the Eesafzais never paid revenue is variously given. An account is, that the Eesafzais gave great annoyance to the authorities of the emperor Akber, when building the fort of Attock, and therefore when it was finished, a force of 12,000 men under the Wazeer Beerbal, was despatched against them, which was utterly destroyed by a miraculous shower of stones which fell on them in the Kala defile, brought down by the curses of a mad Eesafzai fakeer, by name Jahan khan, an Umar khel, who received some injury from one of Akber's authorities.

Akber granted them, in fear, a perpetual indemnity from taxation, and none of the Chaghatai, Moghul, or Affghan monarchs assessed them until the time of Runjeet Singh, who took advantage of their internal dissensions to get possession of the greater part of Sammá, from which he levies revenue only by yearly sending a large force to collect it.

Nadir Shah is also said to have remitted their revenue on account of their restoring to him his crown, which one of them stole while he was encamped near the Attock or Indus. Some say that it was remitted by a monarch, who became alarmed at getting 9,00,000 spears of revenue, which he once ordered to be collected at the rate of one from every house. Others say that it was remitted in consideration of the poorness of their country, and on condition of their eternally waging a religious war of extermination against their northern neighbours, the Cafers.

Mandad is said to have had five sons, whose descendants occupy the Sammá country of the Eesafzais (Afghanee) or Yoosafzais (Persian).

Kamal and Aman were two brothers, whose descendants were called, and are so now, Kamalzais and Amanzais.

The former are again divided into Mishar, (elder) Kamalzais, and Kishar (younger) Kamalzais.

The Mishar Kamalzais hold the villages of Hotee, Mardan, Mayar, and Baghdada, each containing about 2000 houses. Their chief oc-

cupation is trade in saltpetre. Their chief is Ahmad khan, son of Lashkaree khan of Hotee, who collects the revenue for Runjeet Singh from these four villages.

The Kishar Kamalzais hold the villages of Toroo, Ghala Deree, and Gujar Gadee, containing each on an average 2000 houses and 200 shops, to which merchants from Swat, Michnee, and the Punjab resort. Their chief is Daleel khan, son of Jalal khan, who is an enemy of Ahmad khan's, the latter having with the assistance of the Sikhs taken possession of his estates. Each of those villages could furnish 700 foot and 80 horse. Ahmad khan is a son-in-law of Anayatullah khan of Swat.

From Toroo to the east four kos are the Amanzais, who are again divided into Doulatzais and Ismailzais.

The Doulatzais hold Gurhee Amanzai, Gurhee Kapoorah, Shahbaz Gurh (Kot), and Derah Gurhee, each of which villages contains on an average 4000 houses, and could furnish 2000 foot and 200 horse. Their chiefs are Nasarulla khan, Namdar khan, and Ameer khan.

The Ismailzais hold Gumbat, and Barah Kot, and two other villages, each containing on an average 4000 houses and 200 shops, and being capable of furnishing 1000 matchlocks. They have to the west the Kalpanee stream generally speaking, but there are villages on either bank. Their chiefs are Mansoor khan and Zyarat khan. Sardar Huree Singh took away from the Ismailzais two guns that they had. The Amanzais have 3000 jarebs watered by the rain, and 1000 jarebs watered by the Kalpanee. They have internal feuds, and are constantly employed in fighting among themselves, or in robbing the highway. They are somewhat held in restraint by Ahmad khan, the Sikh spy. The ground on the borders of the Kalpanee, is capable of being cultivated to a great extent were safety secured the cultivator by a powerful government, and lacks of rupees of revenue might be collected; much of the land is capable of giving a ten-fold return on the seed.

The Sama country is bounded on the west by Asnee Kot, on the east by the Abaseen (Indus) at Amb, and Daraband on the south by the Attock (Indus), and on the north by Swat, Buner and Sudoom. It is 38 kos by 26. A particular account of the villages in it has been given to Major Leech, by Shekh Khashalee.

The country of Sama chiefly depends on the rain, and grows one crop. In some parts two crops are grown, where running water is procured.

The whole of Sama is said to be able to furnish 2,30,000 foot, and 12,000 horse.

From Gurhee Amazai to the north, towards Sudoom, fourteen kos, is the hill called Kadamar, beyond which is the village of Garyala, consisting of 100 houses on an eminence. This hill Pass is the boundary of Sama and Sudoom. The village contains seventy matchlocks, footmen, and six horse, under Lashkaree khan, who is at enmity with Mansoor khan, and friend with Nasarulla khan.

Two kos further is Gulyara, a fort on an eminence, of a square construction, containing forty kos within and 400 around it, with seven shops, and furnishing 200 foot, 27 horse, under Mansoor khan, and Yakoob khan, and Maddat khan. There are 700 jarebs in cultivation. Below the fort, there is a stream running from north to south.

Three kos further to the east is a hill called Doda, on which there are 400 houses under Afzal khan. Cultivation 600 jarebs.

One and a half kos to the north is the village of Sirah Derai, containing 600 houses, furnishing as many foot, and twenty horse, under Ashraf khan. Their lands are chiefly *lalmee* (dependent on rain.) They have some *abee*, (watered by streams or wells) also. The name of the stream is Naraikhod, which rises in the hills to the east. They are enemies of the men of Gurhee Amanzai, and friends with the men of Taroo.

Two kos to the north is the village of Machai, containing 160 houses, under Meer Mobeian khan and Ismail khan. Cultivation, *lalmee* and *abee*, giving two crops. They are independent.

One kos further is the village of Char Gholai, containing 300 houses, under Ameer khan. Cultivation mixed, (*lalmee* and *abee*.) They use the water of the Naraikhod for drinking: they are independent. To the west in the plain trees abound.

One and a half kos further is the village of Osai, containing 200 houses, under Meer Mobeian. Cultivation 700 jarebs *lalmee*, and 100 jarebs *abee*. The drinking water from the Naraikhod.

Two kos further is the village of Rustam, containing 600 houses, under Ramatulla khan. Cultivation 1000 jarebs *lalmee*, and 200

jarebs abee. The drinking water is from a stream issuing from the hills to the north. They are independent.

One and a half kos further to the west is the village of Bazar, containing 700 houses, under Mansoor khan. Cultivation 2000 jarebs lalmee, and 300 jarebs abee. Drinking water from the stream.

Further on to the west off the road are the villages of Palee, Cheenah, Suroch and Landai, each containing 300 houses, under Sahab Shah Nujan. The cultivation of each, 1000 jarebs lalmee and abee.

Two kos further on is the village of Alee, containing 700 houses, under Mansoor khan. Cultivation 1000 jarebs lalmee, and 100 abee. Independent.

Further on four kos to the north-east, through a jungle over a winding road, two villages are reached, one called Peetawai, the other Syarai, under Malik Gujar. They each contain seventy houses. The hill which is here called Mabandarai, is the boundary of Sudoom and Bunher. The Khatak, Eesafzai, Samah and Peshawar merchants go by this Pass to Bunher. It is difficult for laden yaboos, bullocks, and asses. The ascent is four kos, and the descent two.

From the village the road leads to the north, winding up the hill which is very thickly wooded, the interwoven branches sometimes stopping the road; it is not of course a road for guns or even camels, a horseman being often obliged to dismount and lead his horse. Trees of different kinds, among them the Archah and Jalghoza, (fir and pine) are to be met with on these hills. The descent into Bunher from the top of the Malandasai Pass, is through a ravine. In this part of the country Mullahs and students (yalibilms), are much respected. There is no water in the Pass, or on the hills. In winter snow falls on the Pass, but does not lay on the ground.

One and a half kos from the Pass is the village of Zangee banda, in Bunher, in which there is no water. The inhabitants bring their water in pitchers from a spring at the foot of the hills to the north, one and a half kos distant. Cultivation 400 jarebs lalmee, and no abee. There are 130 houses, under Malik Kadazai.

On the road after descending the Pass, there is a shrine, or Mazar, of one Shekh Sher Kookho Baba, and a grave-yard. A fakeer, with his wife, officiates at the shrine. Kaffilas take a rest here. It is also a stage or halting place.

Three kos further to the north is a village called Nawai kilee, containing 700 houses of Burkhah-khel Eesafzais Bunherwal, under Zyarat khan and Meer Sahab khan. The cultivation is lalmee.

From this village to the east, in the hills, is a valley called Yoosaf Darrah, in which there are 400 houses; and adjoining it to the north-west is another valley, called Ghanum Darrah, containing 800 houses. Cultivation lalmee. Trees of the kinds Zaitoon, (olive) Baloot, (holly-oak) Archah, (fir) are plentiful, and serve for firewood. The interior of the valley is attractive and open, but the inhabitants are a lawless set, and have many quarrels at the time of changing lands. Their chief is Ahmad khan, son of Azad khan.

One and a half kos further on is the village of Kadappa, containing 300 houses, under Maddat khan and Muneer khan. Cultivation lalmee. Their drinking water is brought from a distance in pitchers on the head. They have large flocks and herds.

Two kos further north is the village of Pishtool Darrah, containing 1000 houses of Doulatzais, under Manzal khan and Natab khan, embosomed in hills. Cultivation 2500 jarebs lalmee. Their drinking water is brought from a distance from the east.

To the north of the village the road leads through a defile so narrow, that a laden ass passes with difficulty. Half a kos after getting clear of the defile a river is reached, flowing from west to east through hilly defiles, until it falls into the Abaseen. It fertilizes the whole of the Bunher lands, and those who inhabit its borders cultivate rice and chiefly live on it, boiled soft and mixed with ghee. The cultivation lalmee; wheat on rising grounds and skirts of hills.

To the north of the road across the river is the village of Shil Bandai, containing 400 houses, under Bahadur khan.

There is another, called Kalpanai, containing 500 houses, under Shahdad khan.

There is another, called Mash katta, containing 400 houses, under Fazal khan, and Bhadur khan, the son of Shahdad khan.

There is another called Kulgarai, containing 400 houses, under Nouroz khan.

There is another called Matwaridain, containing 2000 houses, under Mahib khan. They each cultivate the land of their bakhrah, or



share, and pay no revenue. Their Maliks only commanding them in feuds with neighbouring Khels.

Three kos further to the west, after crossing a rising ground, is the village of Dakad, containing 300 houses under Azeem khan.

Two kos further to the north, is the village of Derai, containing 300 houses under Hajeah khan.

Further to the left (north) of the road, is the Burindoo river, flowing from west to east; and to the north of the road, a hill has been cut through by some king of old to give the river a passage, through which it rushes with great violence. The volume may be of 100 mill strength. The breadth of the cut may be twenty paces or less; on each side of this hill there is a plain. The name of this cut is Soorai kand.

Five kos further to the west, is the village of Heelai, the road being very bad through jungle, and over descents and ascents. The head of the village is Futteh Ali khan, son of Madar khan, Ashezai. It is divided into fourteen hujrahs, contains 1500 houses and 47 shops. The merchants from the Khattak country bring salt, cotton, oil and cloth, and take away grain, ghee and honey, to Peshawar. The inhabitants drink the water of the Burindoo, on which there are 25 water mills, which grind flour for the whole country. The village is on a soft rising ground, on which there are fissures caused by the water on all sides. The river passes in rear of the village; to the south of it firewood and forage are procured from the hills. The country abounds with sheep, cows, buffaloes, and goats. They are friends with the Salarzais and enemies of Doulatzais. Cultivation on rising ground (lalmee) 2000 jarebs, and on the river bank (ábee) 1000 jarebs (rice and Indian corn).

Two kos further is the village of Dagar, containing 400 houses, under Bahadur khan.

Three kos to the west is a large village called Anghapoor, consisting of 14 Hujrahs, containing 2000 houses and 50 shops, under Jarwar khan and Rahmat khan. Cultivation 2000 jarebs lalmee, ábee 1000 jarebs; the rubee fusul, wheat and barley; the inhabitants live principally on rice; they are enemies of the Salarzais and friends of the Noorzais.

Four kos further is a village on a rising ground called Torasak, composed of 18 hujrahs, and containing 2,500 houses and 50 shops, under Bulaud khan, who is a friend of Tallalee khan of Heelai, and an enemy of the Salarzais.

From Heelai five kos to the east, is the shrine of Peer Baba, the spiritual father, and place of pilgrimage of all the people of Swat, Bemher and the Eesafzais. There is a village also called Zyarat, containing 1,000 houses and 50 shops, under Myún Sayad, Sarbulund Shah and Myung Sayad Ahmad Shah and Afzal Shah, and Maliks Saádut khan, Tozal khan, and Ahmad khan. The Zyarat of the Peer is surrounded with numerous sheesham, zaitoon and mulberry trees. The Zyarat has no dome; there are two sarcophagus in the shrine of ornamented gypsum, over the tombs are narcissus, zumbuk and roses growing, and the mujawuns, or officiating priests, amount to 400 or 500; they receive all votive offerings and offerings as thanksgiving. The Shekhs and Sahabzadahs entertain all visitors and strangers. The whole people of Bunher are more or less influenced and guided by these Sahabzadahs.

Twelve kos to the north-west is the Kadakad hill, beyond which is the Pergunnah of Swat, and on the road are the following six villages.

1st. Kingar galai, consisting of 200 houses, under Shahbaz.

2nd. Chhurai, containing 300 houses and four hujrahs, under Abdulla khan.

3rd. Bazargai, containing 300 houses and four hujrahs, under Azam khan.

4th. Bam pookhah, containing 200 houses and four hujrahs, under Maddat khan.

5th. Johar, containing 300 houses and four hujrahs, under Maddat khan.

6th. Sugaren, containing 500 houses and four hujrahs, under Maa-zam khan.

Each hujrah contains eighteen bakhrahs, and each bakhrah twelve rupees, (jarebs?) and to every rupee twenty foot men, and 2 swars. Every rupee contains sixty jarebs of land.

Their drinking water is from a stream that issues from a ravine. They are all Salaizais, and are at enmity with the Ashezais and

friends with the Doulatzais, and are independent. There are 2,000 jarebs of lalmee cultivation on rising grounds, and 1,500 ábee on the banks of the stream, (Shelah.) The inhabitants are owners of large herds and flocks.

There are besides in all directions villages in vallies in the hills. For instance, to the east, near the Abaseen river, are the following :

Bagra, containing 500 houses under Buland khan. Babda ditto 400 ditto. Padba ditto 500 ditto. Chagharzai ditto 700 ditto, Aman khan. Marhad ditto 400 ditto. Kot and Cabal. ditto 700 ditto, Sahah khan.

The inhabitants of the above are Sherzais and Eesafzais. Their chiefs are Iman khan, Buland khan and Sahab khan.

The cultivation is 4,000 jarebs of lalmee, and 1,500 jarebs of ábee, and each village contains two or three hujrahs each.

To the west is Ghazee khanah, containing 700 houses and four hujrahs, under Sarwar khan, Gudazai, the ábee cultivation being from the Burindoo.

Three kos further is another village called Nadai, under Ralmat khan Gudazai, containing two hujrahs and 200 houses. The above two chiefs are friends, and at enmity with Mohsan khan Shamaszai.

Three kos further is a village called Bae, under Mohsan khan, containing 400 houses and three hujrahs, and the shine of Sultan Wais Baba.

There is another village called Badshah kilai, containing 400 houses of Gudazai, under Noor khan and Zattullah khan. I have heard, as I said before, from old and intelligent men of Bunher, that two of the three tribes of Eesafzais inhabit Bunher vizult, Maleezais, and Mandeezais.

The Maleezais are again subdivided into the following five gurohs, Gudazais, Salarzais, Ashezais. The tribe of Top Darrah, and Panch-paes.

The Mandezais are also again subdivided into the two gurohs of Doulatzais and Noorzais. The whole pergunnah of Salarzais, containing twenty-four hujrahs, on each of which matchlocks, horsemen, and lands are distributed. The chiefs are Kachkol khan, Baba khan and Alam khan.

The whole pergunnah of Gudazais, contains sixteen hujrahs.

That of Ashezais twenty-one hujrahs.

That of Top Darrah eighteen hujrahs, and that of Panchpaees twenty-two hujrahs.

The whole of the Maleezais have 101 hujrahs. The Doulatzai, Maleezais have thirty-one hujrahs, and the Noorzais forty-two hujrahs, making in all seventy-three.

The Gudazais are divided into four Tappahs. Husen khel to the east have four hujrahs, under Sarwar khan.

Husan khel to the north, have four hujrahs, under Kachkol khan and Baba khan and Alum khan. Aleesher khels, to the south, have four hujrahs, under Nouroz khan, Alee khan and Ahmad Shah Megan.

Ibrahim khels, to the north-west, have four hujrahs, under Deewan Shah.

Between the Aleesher khels and Ibrahim khels, there is a distance of five kos.

The Salarzai Maleezais have seven villages to the west.

Hujrai contains three hujrahs, under Shahbaz khan.

Seegaren contains four hujrahs, under Abdulla khan.

Kingargalee contains four hujrahs, under Azam khan.

Seiz contains four hujrahs.

Bazangai contains four hujrahs, under Azam khan ; Johar and Bam-pookhah, contain each four hujrahs, under Sargandai and Hijran. They are enemies of the Gudazais.

The Ashezai Maleezais, have three towns. Heelai contains seven hujrahs, under Fattalee khan.

Aughapoor contains seven hujrahs, under Daum Shah.

Torahsak contains seven hujrahs, under Afzal khan ; each of these towns has forty or fifty shops, frequented by Putwad Puklee, and Chuch merchants.

Top Darrah has four villages ; two of them have three hujrahs each, and the other two four each, under Alam khan.

The Panchpaees have five villages ; three of them four hujrahs each, and two of them five each, under Taoos khan and Ghazee khan.

The Doulatzai Mandezeais have three villages ; Dagar has two hujrahs, under Shah Doula. Six kos to the south, there is a village called Bandeezai, having five hujrahs, under Fatteh khan.

Six kos to the east, there is a village called Thil bandai, having eight hujrahs, under Nizam khan.

The Noorzai Mandeenzaes, have ten villages, each of four hujrahs, to the north-west, under the Eelem hills; their drinking water being from the Burindoo river, and from springs, under hills to the south.

Their chiefs are Mansoor khan, Ahmad khan and Azad khan. The names of the villages are Kharappa, Reega, Noukalee, Sadacheena, Derai, Barkalaipanchpao, Deegda, Paltoreen, Kohkandee, two villages, upper and lower.

Another tribe, the Moleezzaes, are towards the east, at the entrance of a valley, at a distance of nine kos. They have two large villages, Kalpanee and Talpanee, having each four hujrahs, under Arab Shah Bunherwal. The Khattak merchants, bring salt, oil, and cloth, laden on bullocks; and take back, ghee, honey and rice. The Maliks levy from them as black mail, 1/24th rupee per load.

Bunher is surrounded or bounded in all directions by hills, that have separate names.

To the east, is the Handoo hill, having an ascent of three kos, wooded with Jalyhozah, Archah, Zaitoon and Baloot trees, and frequented by monkeys, bears, hyænas, wolves, the hill Gongawaz, and wild goats and parrots, sharaks, and the seven colored bird, the kabk, the sisee.

Nothing is known of mines in this hill. Scanty streams are fed from the melting of the snows on these hills in the winter, and grazing is found on it for cattle and flocks in rich abundance.

This hill is within the jurisdiction of Ahmad Shah, and Deewan Shah, Alee, Sher khels. The road over this hill is not practicable for camels, it is difficult even for horsemen. The inhabitants on its skirts do not live in forts, but they are rich in flocks and herds.

To the south there is a hill and a Pass called Mah Bunher, thickly populated, and having mines of zâk and sulphur.

To the south are also the Malandarai hills and Ghudoo hills, through which there is a road taken by people from Samah to Bunher.

To the west there is a hill called Jafar, and another called Koh Kanda, abounding with masonry, remains of Cafer buildings, the ascent and descent of which is eight kos. It has no mines, is very

difficult of ascent, and snow falls on it. It is within the jurisdiction of Malik Buland khan, Sherzai; the alchemist's plant is found in it.

There is a hill to the north, called Eelam, or rather two, one called Loeë Eelum, and the other Oodookai Eelum, having an ascent of four kos; snow falls on it to a great extent. It is in the jurisdiction of Shahbaz khan, Azam khan, and Abdulla khan, Salarzais, and Ahmad Shah Myan. In the Pass to the north is the splendid shrine of Sayud Meer Alee, Turmezai, known as Peer Baba. From the Handoo to the Jafar hills is twenty-nine kos, and from the Malandarai to the Eelum hills is twenty-five kos. The Burindoo river runs within these boundaries. It comes from the south by the village of Sugaren, which is in a valley and winding, and fertilizing the land on its banks goes east by the villages of Parbha and Jafarzai and Babda, and over the plain of Bakda and Marhad, and falls into the Abaseen.

After gaining this information I left Bunher for Swat.

The whole cultivation of Bunher may be stated at 50,000 jarebs lalmee, and 35,000 jarebs ábee. It may be said capable of furnishing 60,000 foot matchlockmen and 5,000 horse, and to contain 111 villages, large and small.

From Bunher to Swat, there are three roads. One over the Jwaharai hills to the south, which are very lofty, having an ascent of seven kos, and snow always on its summit. It is not a camel or horse road, and foot-passengers even meet with difficulties. On the Bunher side of the hill there is a village called Poolhanad, containing 120 houses of Gudazais, under Myán Sayud, Amad Shah, a descendant of Myán Sayud, Munawar Shah, alias Peer Baba; and on the other, or Swat side, to the north-east, are two villages, called Sipal Banbai and Mingoda. This road bears north-east from Peer Baba. Their chief is Zaidulla khan, Baezai Swatee; there are 700 houses. The distance from Peer Baba to Sipal Bandai is seventeen kos.

The second road is over the Karakar hill to the north-west. On the Bunher side is the village of Sagaden, containing 700 houses, under Najaf khan, Kasam khan and Nazeer khan. The ascent and descent of this hill is nine kos.

On the other side is a village called Nawahgai, and two kos further on in Swat is the village of Barah Kot, inhabited by Babazais, under Ghazan khan, son of Mahammud Jeev khan. This road is passable

for horsemen and laden bullocks, but on account of the robbers, guards are required. Many kinds of trees and wild animals are to be met with in these hills.

The third road is over the Kaleel hills to the south-east, and winding. There is a village on the Bunher side, called Garkand, containing 600 houses of Salarzais, under Darah Shah. The ascent and descent is five kos. The road is difficult, and little frequented. The hills are plentifully wooded. On the other side are the villages of Janbel and Kokorai, each containing 100 houses, under Zafar khan Babazai. From Gohkanda to Kokorai is eight kos.

I went by the village of Shkha kot. Of the tribes of Maleezais, Mandeezais and Akozais, the two former of which inhabit Bunher, and the latter Swat. The Akozais are divided into three tribes: Rarenzai, Baboozai, and Khwazozai.

The Rarenzais have 12,000 matchlock men, and 3,500 jarebs lalmee, and 1,500 jarebs ábee, and fifty-two villages, under Anayatulla khan, son of Abdulla khan, who himself has two villages, one on this side, to the west, towards Hashtnagar, and the other on the other side of the Mullah kand, called Allahohand, where he resides, to the east in lower Swat called Aswat.

Swat is divided into Sar Swat, Bar Swat and Deer, chiefly under Anayatulla khan, and a small part, under Zaidulla khan Babozai, and Ghazan khan Khwazozai.

Some of the villages under Anayatulla khan, are as follows:

Those towards the Mullah kand are fourteen in number, Vizut, Narai, Obo, consisting of 300 houses; Doobandai to the west, containing 400 houses, half a kos from Mulahkand; Bhorek to the west, one kos, containing 300 houses; Iskhakot to the west, containing 1,500 houses; Gadai, two kos, containing 400 houses. Heeran kot, containing 500 houses to the north-west, one and a half kos, having 1000 jarebs of lalmee; Dargai, two and half kos to the north, contains 1,500 houses; Kharkai, two kos to the north-west, contains 700 houses; Dareer, two kos to the north, contains 400 houses; Sanez, two kos to the north-west, contains 400 houses; Paroo, one and a half kos to the west, contains 300 houses; Kaldarah, two kos to the north, contains 500 houses; Kadam khel, one kos to the east, contains

200 houses ; Baghdarah, one kos to the north, under the Malahkand, contains 150 houses.

Between Swat Proper and this Swat, is a hill over which there is a Pass ; the name of the hill is Malah kand.

From Skha kot to the north-east, five kos, is a road partly through a defile called Jambar, through which there always blows a violent wind ; there are two mounds in the defile, called after Adam and Darkhanai, because these lovers met there.

There is another unfinished road over the hill to the north, said to have been commenced of old by a monarch, named Kumran Shah, who intended by it to lead an army to subdue Swat, but died before it was finished, and the Swatees destroyed much of his work, and opened the road by the defile : traces of this road over the Malah kand are still visible.

The merchants of Hashtnagar, the Khatah country, the Duabah, and Samah, bringing Karbas cloth, cotton and salt, on camels and bullocks, pass into Swat viâ Skhat kot, Dargai and Jambar, by the Malahkand Kotal.

The following duties and black mail are levied,

On a load of Salt,	.. ..	3 shahees, (1/12th rupee).
Ditto ditto Cotton,	.. ..	5 do.
Ditto ditto Ghee,..	.. ..	5 do.
Ditto ditto Cloths,	.. .	6 do.

by Anayatulla khan, for which he protects merchants.

The whole country of the Rarenzais, is under Anayatulla khan.

After passing the Malahkand, and entering Swat itself, the following Rarenzai villages, under Anayatulla khan, are met :

Shahar, of 200 houses ; Dahrai, 200 houses ; Jolagram, 300 houses ; Matkaran, 200 houses ; Hissar, 200 houses ; Tootakan, 200 houses ; Shaibetai, 400 houses ; Batkhelah, 1000 houses ; Nonkalai, 300 houses ; Amankot, 300 houses ; Allahdant, 2000 houses ; Bandagai, 100 houses. Besides these there are many smaller villages, having twenty and thirty houses each.

The villages that I visited myself, shall be fully described.



Anayatulla khan has married the sister of Zaidulla khan, and thus cemented a friendship. By her he has several sons. He is at enmity with Ghazan khan of Deer, and Meer khan of Bajour.

There is another tribe in Swat to the East, called Baboozai, who have seventy villages and 18,000 matchlock men, (foot) under Zaidulla khan, the son of Hasan Aleo khan, and Mazulla khan, the son of Jamand khan, a Khankhel. This tribe, especially to the south, is very unruly. Their lands are on the skirt of hills, and in valleys and on streams, some lalmee and some abee.

The river Sandai runs through the whole of Swat, from the boundary of the Rarenzais to that of the Banzais, is one and a half kos. The villages are: Bakhta, Tharan, Jalalah, Nawahgai, Natmeda, Dagai, Satmeda, Badeekot, Ashteekeot, Amboohah, Garhatai, Panjgram, Karatai, Namee kalai, Bar kalai, Haibat gram, Koth, Kotagai, Mingrawad, Sangootah, Manglawar, Charbagh, Julaibagh, Teekdarai, Khoonah kateelah, Saidoo, three villages, Singuradad, Aleegai Sokat, Malhar, Kamharkalai bagh, Jooleezai, Alamganj, Matwarairi, Khwazah khel, Mirgai khel, Barah khel, Panjeeegram, Hoodeegram, Jinkai khel, Nipkai khel, and Baloogram.

There are other smaller villages in the hilly valleys.

Zaiddullah khan pays in ready money, 200 Suwars and 500 foot.

The third tribe of Swat are the Khwazozais, under Ghazan khan the son of Kasam khan, the son of Mulla Ilyas, whose authority over his clan of Deer is great.

They are estimated at 38,000 matchlockmen. In the valley of Swat there are fifty-four villages, and in the valley of Deer sixty-two villages.

There are two rivers in the Pergannah of Ghazan khan; the Swat river, flowing from south to north, called Sandai, and the Deer river. The villages are mostly in hilly valleys, and few in plains. There are high hills on all sides. The cultivation consists of 38,000 jarebs lalmee.

They are all under Ghazan khan, who in every village has posted a man of his own as Malik, to hear the complaints of the ryots. He takes  $\frac{1}{5}$  of the produce, or cultivates  $\frac{1}{5}$  of the lands. There are four small forts, each having 50 or 80 houses, and villages containing

100 and 200 houses, populated on the hills. The villages of the plains have each from 500 to 1000 houses.

Samah and Khatah merchants bring salt, oil, cotton and cloth, and take away ghee, honey, rice and wheat, on bullocks and mules.

The people that he appoints as Hakims and Maliks of villages, have portions of land allotted to them in lieu of pay.

Ghazan khan himself resides in the fort of Deer, and has 140 horse and 400 foot constantly about his person, whom he pays in ready money. The following are the names of the hills in Ghazan khan's country,

First Maujah to the south, well wooded, having an ascent of four kos, and the same descent. There are plenty amlook and other trees; snow lies on the summit throughout the year. The road from Bar Swat to Deer leads over it, which is impassable to camels and horsemen, footmen even finding difficulties. Monkeys, apes, bears and tigers abound, and are to be feared, so are the thieves infesting it; such are not to be heard of in the jurisdiction of Ghazan khan.

The second hill is the Barawal to the west, having walnut as well as other trees. The ascent and descent are each five kos; much snow falls. There is an iron mine.

The third hill is that of Deer, to the north, very high, having an ascent and descent each of seven kos; snow always remains on it throughout the year.

The fourth hill is called Kumbad, to the east, the ascent is seven, and descent six kos. There is an iron mine, the metal of which the inhabitants extract. The road to Bajour passes this hill, frequented by Bujour, Deer, and Kashkar merchants. Ghazan khan is on friendly terms with Shah Katal of Kashkar, and Meer Alam of Bajour, and is at enmity with Zaidulla khan, Babozai Swatee, and Anayatulla khan, Rarenzai.

There are a number of hills besides these. The Khwazozais are divided in Maleezais, Shameezai Nurlee khels, Shameezais Pinkee khels.

The Shameezais to the west, muster 5,000 matchlock men, and have 3,000 jarebs of cultivation, under Buland khan, and Sara'ee, and Sayud Azam khan. The names of the villages are,

Barangola, contains four hujrahs, under Nahit khan and Buland khan.

Badawan, under Ojee khan, Ghawaz khan, and Sayud Azam khan, contains four hujrahs.

Chack Darrah, under Akal khan, and Dilawar khan, contains four hujrahs.

Sih Sadah, under Noor Alee khan, contains four hujrahs.

Ooch, under Ghulam Muhaiyadeen khan, and Maksood khan, contains four hujrahs.

Katyaree, under Raman Shah khan, contains five hujrahs.

Shewah, contains six hujrahs, under Munawisar khan.

Palah Mandai, under Hoorah khan, contains four hujrahs.

Neegwalai, under Ahmad khan, contains three hujrahs.

Kajookam, under Fazal khan, contains four hujrahs.

Damghar, under Ghafar khan, contains four hujrahs.

Seen Sarai, under Aman Shah khan, contains four hujrahs.

Gadai, under Nyamutulla khan, contains three hujrahs.

Doorgai contains four hujrahs, under Assalla khan.

Chalgar, under Muazzam khan, contains four hujrahs.

Other villages are in the defiles, and on the hills, containing ten or twenty houses each. The inhabitants are owners of herds and flocks.

The Shameezais muster 7000 matchlock men, and have 11,000 jars; Beshah khan is their chief, and Kamal khan, Muazzam khan, Kahur khan, and Arsulla khan. The villages extending for fifteen kos, are the following,

Shilpum, contains four hujrahs, under Kahur khan.

Shakur Darrah, contains five hujrahs, under Arsulla khan.

Baba khel, under Muazzam khan, contains six hujrahs.

Teensat, under Padshah khan, contains four hujrahs.

Khadhadsha, contains four hujrahs, under Anwar khan.

Baidarah, contains five hujrahs, under Kan khan.

Dursha khel, contains four hujrahs under Kamal khan.

Kalat, the principal village of the Shameezais, contains fourteen hujrahs, under Beshah khan.

Sekhras, under Kamal khan, four hujrahs.

Doda, contains four hujrahs, under Ahmad khan.

Dursha khel has four hujrahs, under Raham khan.

The Nepkee khels, called Naipee khels, Mirlee khels, extend twelve kos to the north. They muster 9,000 matchlockmen, and have 15,000 jarebs.

Jahkandara has four hujrahs, under Painda khan.

Kanjoor contains three hujrahs, under Ourang khan and Fazal Shah, and Roshan khan.

Neem galai, two kos to the south, two hujrahs, under Jamad khan.

Dehli, one kos to the south, two hujrahs, under Arab Shah.

Barah Bunda, one and half kos to the south, contains four hujrahs, under Roshan khan, son of Arsalla khan, Neepkee khel.

Koozamandai contains four hujrahs, under Malah Shah, Meeran Shah and Arab Shah, one kos distant.

Damghar contains three hujrahs, at one kos to the south-west, in the plain from Barah Banda, under Rahmat Shah.

Dumgram contains two hujrahs, at one and a half kos, under Mahammad Zaman khan.

Koojkanjoo, one and a half kos to the south of the road in the plain, on the bank of the Swat river, two hujrahs.

Barkanjoo contains two hujrahs, under Nooran Shah and Shekh Gulpurust.

Their is a large village, ten kos from Kanjoo, having five hujrahs, under Gulistan khan, Paindah khan, and Shah Beg khan.

Two kos, on the skirts of the hill to the west, is a village called Seenai, containing three hujrahs, under Yoosaf khan, son of Umar khan.

Further to the north, is a village called Sar Sodai, two kos from Aleegram, containing four hujrahs, under Jadullah khan, and Faiz-talab khan, Myan Ahmad Noor, Speen Myan Abdullah khan, and Awal khan, in the plain. Their drinking water is from a stream that comes from the Manjuh hills, to the north; the whole of the lands of Swat depend on the rain.

There is a village, Mandee, where merchants exchange their salt, cloths, and oil, and cotton, for rice and wheat. The copper coin current are Mansoorie pais or Mansoor khanee, and they prefer old round Ghunda rupees, indeed no others are current. There are no Hindoo shops throughout the country of the Pingee khels, the only merchants being Paranchas and Mullas, who command great credit; the people

are very unruly, but are held in some check by Ghazan khan of Deer.

Three kos to the north is the village of Toot Banda, under the Manjah hills, having three hujrahs, under Maddat khan.

To the north-east is another village, called Manjah, under the hill of that name, containing 127 houses, under Jalat Khan.

To the north, within the defile of the hill of Manjah, one and half kos, (the road over the hill leads to Deer) is the village of Kalakee, containing seventy houses, under Myan Ahmad Gul and Speen Myan; walnuts and Amlook trees are plentiful. I went by this road myself to Deer.

The Mooleezai Khwazozais inhabit the hill defile towards Deer.

Passing the Manjah hill there is the village of Tangee, consisting of two hujrahs, under Shad khan, under the hill to the west of the road.

Two kos further is the village of Kandareen, consisting of three hujrahs, under Mazroob Shah khan, Saidoo khan and Marghoob khan. A stream flows below the village, having its rise in the Manjah hills, of ten mill strength, and empties itself into the river of Deer. The people of the country live chiefly on rice.

Two kos further, in a defile, is the village of Chaghareen, consisting of two hujrahs.

One kos further is the village of Shakandair, consisting of two hujrahs, and containing 100 houses, under Noor Shas khan.

One kos further is the village of Ateetai, containing 100 houses, and consisting of one and a half hujrahs, under Sahab Shah khan.

Further, beyond the stream to the south of the road one kos, is the village of Razagam, consisting of two hujrahs, and containing 300 houses, under Kutub Shah khan.

After leaving the defile of the Manjah hill, is the village of Tor-Sang, two kos to the north on an eminence, containing 700 houses. It is on a table land, the ascent to which is half kos.

The road to Deer passes by it to the north. The Malikis are Buland khan, Alee khan, and Saadat khan. Under the village to the west, flows the river of Deer, beyond which to the west, are very high mountains. There are a very few villages across the river, not so on this side, as far as Deer.

Seven kos to the north, from Tor-song, is the village of Jughabunj, having 200 houses, and one and a half hujrahs, under Buland khan and Mahammad khan, and Mulla Sayad Alee.

Four kos further to the north is the village of Bebiyoor, having 200 houses and one and a half hujrahs, under Ahmad khan.

Three kos further, is the village of Dardarah, having eighty houses, under Ameer khan and Buland khan, on an eminence to the east of the road to Deer.

Two kos further is the village of Hindookais, having eighty houses, under Afzal khan.

Three kos further is the village of Benimazee, having 100 houses. On the road there is a stream flowing from the hills to the east, and falling to the west into the river of Deer, over which is a wooden bridge, twenty-three kadams long.

On the bank of the stream to the east, is the village of Katalai, having fifty houses, and on the opposite bank is the village of Kadeekat, to the west.

Three kos further from this to the north, is the village of Kotalai. These villages are under Hasan Alee khan, a relation of Ghazan khan, chief of Deer, from whom he has them in jagire.

Two kos further is the village of Tangai, having 50 houses, under Ghulam Kadan khan.

Three kos further is the village of Hindookar, having 80 houses, under a man of Ghazan Khan.

Three kos further is the village of Jablook, on an eminence to the east, having 90 houses, under Azeemulla khan.

Three kos further to the north is the village of Kotakai, having 70 houses.

Three kos further to the north-east is the town and fort of Deer, under Ghazan khan, son of Karam khan, son of Mulla Ilyas, a Barah khel, Maleezai, Khwazozai, Akozai, Eesafzai, situated on a high table-land, 100 jarebs of which is cultivated.

The fort of Deer, which is situated on the table-land, is of an oblong shape, and has two gates that a horseman can ride through, one to the north facing the Kashkar road, and the other to the south facing Swat and Bunher. The walls of the fort are 12 zirahs high, 400 long, and 300 broad, having six bastions, five along the walls, and

one at the Harem Sarai of Ghazan khan. Within the south gate of the fort to the west there is a large mosk, where lessons are given by the Imam of the mosk, Kazee Abdurahman Akhund; and further beyond the mosk entrance to the west, is the residence of Ghazan khan. There are sixteen shops of Hindoos, five of which are grain-sellers, two druggists, and two cloth-sellers; and seven of Musulmans, four of which are goldsmiths, and three dyers: there are three blacksmiths' shops, and two carpenters. There are 220 houses, and an armoury of 300 matchlocks, and fifty Jazaeers, each two and a half guz long.

Ghazan khan has seven sons: Rahmatulla khan, aged 12 years; Jahandad khan, ditto 9; Hameedulla khan, ditto 7; Habeebulla khan, ditto 7; Sultan Mahammad khan, ditto 5; Azeezulla khan, ditto 3; and Azeemulla khan, ditto 1 year.

He has four wives and many slave girls, and may be forty years of age; of a middling stature, fair complexion, and black hair. He is neither extravagant nor stingy, and is fond of hunting. He is on friendly terms with Meer Alam khan, and with Shah Katal of Kashkar, and at enmity with the Siahposh Cafers.

Deer is surrounded by mountains, on which snow lies all the year round. The country is very cold, and the color of the inhabitants is sallow from the disease of the spleen that they all have. They live chiefly on rice boiled soft, well mixed with ghee: wheaten bread they eat as fruit, (a treat). Their fires are lighted night and day on account of the cold. The ground is damp and swampy, therefore the inhabitants board their floors.

Fir, Pine, Walnut, and Amlook trees are exceedingly plentiful. The gates of the fort are left open.

The manager of Ghazan khan, is one of his slaves, by name Abdul Kadar; and his confidential adviser is Kazee Mulla Abdu Rahman. Another of his slaves, by name Mahammad khan, is the fort Katwal. He has always in attendance 200 foot and 40 horse. He appoints others to districts and villages, from which they draw their own pay.

There are two roads from Deer to Bajour: one winding through defiles to the south-east, by the side of the river, towards the Kunateer road; the other over the Barawal hills, on the south of which is Bajour. It has an ascent of six kos, and a descent of three. It is

well wooded, and affords plentiful pasturage to the inhabitants. It is crowned with perpetual snow, and an iron mine is said to exist in it. It is not passable for camels, indeed the inhabitants know not the animal by sight. On the northern side of the hill is Deer; and on the southern side, in the Darrah of Jandawal, is the village of Akhund Mullah Timmur khan.

From Deer to the north-west are mountains inhabited by Neemchah Musulmans, in which the Musk-deer abound, the hunting of which affords occupation for numbers. A quantity of honey is also produced.

Below the fort of Deer to the east, flows the river which comes from Kashkar to the north, and flows to the south. In it Otters are very abundant, which the inhabitants catch for the sake of their skins to make Posteens, or skin cloaks. These skins, with musk-bags, honey, ghee and silk, are articles of export.

Merchants from Kashkar and the Kohistan, bring Cashkar "Shalukees," and Chapkans (woollen fabrics), and in exchange take away grain.

The merchants from the Eesafzai country and Peshawar bring oil, cloth, cotton, sugar and spices, and take away musk-bags (Nafa), otter (Saglahoo) skins, honey, ghee, silk, and Kashkar "Shalakees."

The road from Swat to Deer is not practicable for camels, horsemen pass along the river with difficulty, merchants carry their goods on mules, bullocks, and men. The inhabitants know not what elephants or camels are.\*

I will give specimens of the dialects spoken by the Neemchah Musulmans of the Kohistan, and by the people of Kashkar and the Baroohee (?) (Purmoolee)—(Furmulee).

\* A story is told illustrative of the gross ignorance of the primitive Affghans. A camel that had strayed from an encampment of merchants, found its way into a Barak-zai khel, (they tell the story themselves,) where one had never been seen. The whole Khel was struck with awe, and were at a loss, all but the village Mulla, who, although as ignorant as his neighbours, determined not to appear so, and therefore boldly suggested, or rather affirmed, that it was the Almighty himself, which they all believed until a young one also made its appearance; and they enquired of the Akhund how the first one could be God as he had no fellow. The Akhund, not taken aback, boldly rebuked them thus: "Why, you fools! the second is the Prophet to be sure." This story I have heard half a dozen times from the blasphemy-dreading, holy-war-making Affghans!



After visiting Deer I returned by the road I came to Jaghayanj, twelve kos, whence to the village of Chakhai is five kos, and thence two kos to the east Atnar Darah. From this to the village of Tormany is three kos to the west, in a defile. In the road is a river which comes from Deer, and passing through defiles joins the Bajour river, which falls into the Swat river, which again falls into the Kunar and Cabool river, which finally falls into the Abaseen, or Attock.

Three kos from Tormang to the east, is a valley in which is the village of Khaeel, having three hujrahs and 600 houses, and close by is a square fort having four towers, containing thirty houses, under Irah khan. There are houses besides without the fort, and 600 jarebs of cultivation on the bank of the river.

From Bajour as far as Khaeel, there is a gun-road, but not so into Deer.

From the above place, one kos, there is a village on an eminence, containing 160 houses and one hujrah called Manjai, under Shadee khan. One kos further to the west there is a large fort containing 200 houses, and a large village containing 1000 houses, under Muckum khan and Shadee khan, called Kilah-i-Shadee khan. Half a kos further is the large village of Kanateer, containing 2000 houses and 40 shops and 16 hujrahs. It is a mart for merchandize, under Naseem khan and Umra khan, each of them have 40 horse and 2000 matchlockmen. The boundaries of Bajour Swat and Deer meet here. The place is under Ghazan khan.

Three kos to the west is the village of Dedai, having 160 houses, under Faiztalab khan.

Here two roads separate, One to the south-east, through the defile of Katgallah leads to Swat.

The other to the north leads over hills to Bajour via the village of Karhadah. Thus from Deraï comes the village of Khemna, containing 200 houses, under Abdulla khan, Farkaride, in Bajour, the road is through a narrow defile which is passable for guns.

Five kos further to the south in Bajour on a plain, is the village of Kadhadah, and on the road there is a square fort built, containing 120 houses, under Faizulla khan.

To the south are hills inhabited by Utman khels, amounting to 10,000 matchlockmen, an unruly set, independent of Meer Alam

khan, of Bajour, and of Ghazan khan of Deer, and of every one else. They are noted for bravery, and live in houses and caves on the hill sides. These hills are partly in Bajour and partly in Swat, and are full of remains of Cafer buildings, from which the Utman khels extract copper coins and utensils, and often gold, and sell them in Bajour. The road over these hills is very difficult for horsemen ; merchants cross with guards with fear. Meer Alam khan tries to conciliate them, as he fears them.

He has more than once taken a force against them, which they have as often defeated. The chiefs of the Utman khel are Khad, Umra, Narai, Bandil, Dilban, and Mardan. They bring honey, oxen, sheep and ghee to Bajour for sale, and purchase cloth and salt to take home.

They sometimes propose to take service, and get jagires and lands allotted for their support, but as soon as they reap their harvest they take to plundering their neighbours, and then to their hills, and defy Meer Alum khan. Every one is chief of his own land, and is under no control. Wheat is much cultivated in these hills by means of springs. The hills are well wooded, and game of every kind is abundant.

From the above village of Kadhadah one road leads to the east to Swat, thus,

Two kos from Kadhadah in the plain, is the village of Gulderee, having 400 houses, under Mulla Daraz Akhunzadah. Thence the Shekah road leads to the east.

Two kos further is the village of Chinah, having seventy houses, beneath which flows the river of Bajour. The land has capabilities, but the tyranny of Meer Alam khan has laid it waste. Guldad khan, a man of Meer Alam khan's, is their immediate ruler.

One kos further, on an eminence to the east of the road, is the village of Yakburj, having eighty houses, under Mahammed Ameer khan, over a bad narrow stony road, very difficult, for camels.

To the south-west of the road is the junction of the Deer and Bajour rivers, whence they run in one stream to Swat ; the road is in a narrow defile called Shikah.

Six kos further is the village of Shamsee khan, on the skirt of a hill to the south of the road, having 850 houses and ten shops. The

cultivation is chiefly in the plain to the north, lalmee. The chiefs are Afzal khan and Misree khan, it is in Swat.

One kos further to the east, on the road, is a large square fort, containing 200 houses, where Misree khan, a man of Ghazan khan, is stationed to collect duties from merchants trading between Bajour and Swat, bringing from Swat salt and oil laden on bullocks. From each load, whatever it may be, 3 shais and 2 paisa is levied, which in the year amounts to 7,000 rupees.

Two kos further to the east is the village of Amlook Darrah, to the south of the road, containing 400 houses, under Padshah khan.

On the hill to the south there are six towers of a large size, and other marks of buildings.

On eminences and in valleys there are very many villages in a good state of repair, having no inhabitants, but difficult of access. The chiefs are Anayatulla khan and Khairulla khan; copper and gold coins are found in these deserted buildings.

Two kos further is the village of Nasapa, containing 100 houses, and many remains of ancient buildings, which no doubt composed towns.

Two kos further to the south is the village of Gumbat, containing 200 houses, behind which on the hill skirt is a very large tower of the times of the Cafers, of excellent construction; but the villagers have pulled it down in parts to make their houses of its bricks and stones.

It is hollow, and has three doorways, the entrances through which are winding. It is said that below this dome the treasures of the ancient kings lie buried.

I visited the place, and searched in vain for an inscription. It is situated in the boundary of the Khwazozais, under Ghazan khan.

Two kos further is the village of Katgalah, containing 100 houses, the road is difficult for camels. Here also on the skirt of the hill, ancient buildings are numerous, like deserted towns. It is in Swat, under Ghazan khan.

One and a half kos further is the village of Talash, on the road at the entrance of a defile, having 200 houses.

Passing the defile a plain is entered, having 500 jarebs of lalmee cultivation, and 100 of abee (rice).

Two kos further are two villages, called Chounnee, containing each 400 houses, under Sayad Aman khan, Swatee, a man of Ghazan khan, the inhabitants a lawless set, and no one can pass the plain without guards, which is called the Dasht of the Shamseezais.

Three kos further to the north, is the village of Shewah, having 800 houses and twenty shops, a mart for merchandize, under Ghazan khan, being on the mercantile route from Bajour to Swat, about 2000 jarebs of lalmee cultivation.

Four kos further to the south east, on the banks of the Landai Swat, there is the large village of Chakdarrah, having 1,200 houses, mostly merchants, included in Swat. Shamseezais by tribe, under Ghazan khan, six hujrahs.

Below the village to the west, is a ford across the river, (no boats or rafts.)

Beyond the river is the boundary of Anayettoola khan, Rarenzai, and the village of Alladaud, in which he resides; on the other side are the Shamseezai Khwazozais, under Ghazan khan. This is the boundary.

There is another road to Bajour from Kurhadab, six kos is the village of Munda, having 2000 houses and 100 shops, under Mahammad Ameer khan, Kochai, brother of Meer Alam khan.

The whole pergunnah of Bajour contains 1,25,000 jarebs, and its revenue amounts to 2,60,000 rupees, in ready money and kind collected on the seed (Kalang), of which Meer Alam khan receives 2,000,000 with his brothers, 40,000 rupees is received by Ameer khan, of Nawazai, an enemy of Meer Alam's, and 20,000 rupees is received by Ghafar khan, the son of Haiyat khan, the chief of Jandawal and Barawal, who is also an enemy of Meer Alam khan's.

The following are the boundaries of Bajour. To the north in the direction of Deer, the Jundawal and Barawal hills; to the south (twenty-five kos length,) the Darrah of Nawazai, and the pergunnah of Kunar. To the east the Darrah of Badwa and the hills of Cuner; to the west (twenty kos breadth,) Pashit and the Darrah of Baboo Karah.

The chief within these boundaries is Meer Alam khan, the son of Allaiyan khan, Salarzai Tarkadeir.

He has thirteen guns, (seven iron taken from Ghafar khan, son of Haiyat khan, and six of copper, 2 of his own.) forty Shaheens, 700 large Jazacers, 8,000 foot, 2,000 horse, six pairs of state drums and

twelve state horns, (Karna,) and standards; in fact he keeps up a regal state. Besides he has Jagiredars.

His whole yearly expences amount to 1,12,000 public, and 8,000 private (stable, table and wardrobe,); 50,000 rupees he pays as revenue whenever any one on the part of the king is sent strong enough to enforce the payment, the remaining revenue enters his treasury.

He has absolute authority over his people, even extending to their wives and daughters, and no one demurs or objects to his disposing of their sisters and daughters.

His friends are Ghazan khan of Deer, and Anaiyatalla khan of Swat; and his enemies are Ameer khan of Nawazai, and Ghafar khan of the Darrah of Jandawal, these he has partially subdued, and possessed himself of parts of their territories.

He is also on friendly terms with Sardar Sultan Mahammad khan, Barakzai, of Peshawar.

Six of his guns are alone mounted on carriages.

The following are the principal places of Bajour :—

Gumbhad, in a valley to the east, under Myan Sahib, furnishing 300 matchlockmen, revenue 3,000 rupees in money and kind. There is an iron mine in the hills, they were formerly under Ghafar khan, now under Meer Alam khan. They collect the iron from the sand of river beds. The pay of Myan Sahib is 800 rupees.

Jundawal is a valley of the Barawal hills, extending to Deer to the north, under Sifat khan, 4,000 matchlockmen, revenue 5,000 rupees. There is an iron mine which is worked. The pay of Sifat khan is 1,000 rupees.

There is another village in the valley of Maidan, which commences in the Kashkar hills to the north, itself bearing east. The inhabitants are Purmoolee, (Barhooee?) under Meer Aman khan, 2,000 matchlockmen. Revenue 3,500 rupees, pay of the chief 400 rupees. There is an iron mine in the Maidan valley, and a river running from north to south. Kanbat, consisting of 9,000 houses with its dependent hamlets, 5,000 matchlockmen. Iron is found in the neighbouring hills which border on Kashkar; name of the chief, Meer Aman khan, son of Meer Alam khan. Revenue 10,000 rupees in money and kind. His

jaghire, Maiyar, rent free, the estate of Myan Shekh Umar, of Chamkanee. Revenue 7,000 rupees under the Myan's daughter. It contains 3,000 houses and forty shops. It is resorted to by merchants, who bring from Kashhar, silk shalakees and chughas, and take back salt, cloth and cotton. The inhabitants were ryots of Ghafar khan, they are now of Meer Alam khan.

From Maiyar, northwards to Zar Mandoo, there are four forts of Shekh khels, under Doola, brother of the late Mujabid khan, 2,000 machlockmen and 4,500 houses. Their custom is that every one who holds three papatahs of land must furnish a matchlockman to the ruler. A papatah takes three kharwars of seed.

Mundah, in jagire to Ameer Mahommad khan, alias Kochai, brother of Meer Alam khan, a brave soldier, having command of 12,000 matchlocks, (footmen,) and 100 horse. He sometimes rebels against Meer Alam khan.

There is another village in a valley called by some Shikah, having eight forts, by tribe Utman khels, who take service under no chief, nor were they ever. When Meer Alam khan marches against them, they declare themselves subjects, and Meer Alam contents himself with their nominal submission, and retires.

There are four forts to the west, called Wadah Banda, in jagire to Juma khan, brother of Meer Alam khan, who has command of 6,000 matchlockmen, and forty sowars, and is night and day employed in hostilities with the Utman khels; revenue 7,000 rupees, his jagire.

The Shahar, or capital of Bajour, is the residence of Meer Alam khan himself. It contains 1,000 houses and eighty shops, and is a mart for merchandize; revenue 9,000 rupees.

In the hills to the west, in the valley of Rodbar, are the tribe of Mahmoodees, who muster 10,000 matchlockmen, they have no Maliks; revenue 4,000 rupees. If the ruler is strong they pay, otherwise not.

To the north is the village of Pishut, in the valley of Baba Karah, in jagire to Paindah khan, brother of Meer Alum, 4,000 matchlockmen; revenue 7,000 rupees; tribe Salurzai Ibraheem khel.

There is another village to the west, called Chahar Sang, furnishing 3000 matchlockmen, under Meer Alam khan.

There is another village called Kotakee, 3,000 matchlockmen (foot) and 1000 horse, in jagire to Meer Aman khan, son of Meer Alam khan revenue 2000 rupees.

Another village is Nawahzai, the residence of Ameer khan, the enemy of Meer Alam khan. There is also a fort on an eminence, stony and difficult ; there is a spring in it. The fort has eight towers.

There are houses right and left, under the fort in the valleys east and west of the fort, the road through them running north and south. The garrison of the fort consists of 500 footmen and 400 sowars. Jazaeers are mounted all round the fort walls, as are two guns. He has 2,000 footmen and horsemen, and his expences are 20,000 rupees, and he collects his revenue on the kalang. The position is a strong one, and Meer Alam khan can do nothing against it. He is on friendly terms with Ghafar khan, with Saiyad Bhawadeen Padshah, of Kunar, and with Ameer Dost Mahammad khan of Cabool and with the sons of Fatoolah khan of Goshta.

He is powerful, conciliating, and of a liberal disposition, and has absolute power over his subjects.

The Safees of Surkh Kunar are also subjects of Ameer khan, amounting to 6000 matchlockmen, who reside in the valleys of the hills, their cultivation depending on the rain ; they have scarcely sufficient drinking water for themselves and cattle.

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*A THIRTEENTH MEMOIR on the Law of Storms in the Indian and China Seas ; being the CHARLES HEDDLE's Hurricane in the Southern Indian Ocean, 22d to 27th February, 1845. By HENRY PIDDINGTON. With two plates.*

In my Eleventh Memoir (Journal Asiatic Society, Vol. XIV. p. 10,) I briefly announced the highly curious and beautiful *experiment*, for such in truth it is, which the Brig "Charles Heddle," Captain Finck, had been performing for us, and for the details of which the scientific world are most deeply indebted to him and to Captain Royer, Master Attendant at the Mauritius ; and I have thought them of importance enough to form the subject of a separate Memoir, inasmuch as they will be found, for the Southern Hemisphere at least, to demonstrate beyond the possibility of a cavil, the fact that the great hurricanes *are* great progressive whirlwinds ; the courses of the "Charles Heddle" during five successive days, admitting of no other explanation ; and distinctly contradicting the notion upheld by Mr. Espy, and other American philosophers, that these storms are composed of numerous winds blowing directly inwards to a common centre, while that centre is moving onwards.

Another fact also demonstrated by this log, and one scarcely less important, is that of the tremendous "Storm Wave," to which I have so

frequently drawn attention,\* for there can be no manner of doubt that the "Charles Heddle" experienced a most extraordinary storm wave of four miles per hour during the storm, and this for five days successively. I refer to the summary and remarks for the details of this, and will only now observe, that this paper is arranged, like the preceding ones; giving first all the data; then the deductions from which the track of the storm, and other phenomena are laid down; and finally, such remarks as may occur. Amongst these last not the least interesting to the meteorologist as well as to the seaman will be the curious result shewn by the analysis of the winds for the five days, shewing them to have been *involutés* of a spiral curve!

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*Log of the Brig CHARLES HEDDLE, Captain FINCK, from the Mauritius bound to Muscat, Nautical time, from Captain ROYER, Master Attendant, Port Louis.*

In forwarding this very remarkable log to me, Captain Royer, as I have elsewhere stated, observes that he thought it so singular, that he had taken the trouble to copy it with his own hand. In reply to farther enquiries from me, he states, that Captain Finck is an able and highly respectable seaman, and that his vessel, the *Charles Heddle*, was originally a slaver, and usually employed in the cattle trade between Madagascar and Mauritius, which requires always the fastest sailers. This accounts for her extraordinary success in scudding, which perhaps few vessels could have persisted in so long without imminent risk.

I have translated her log most carefully from the French, a language with which I am perfectly familiar, and I print it at length, that the whole document may be fully before the scientific public.

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\* See 8th Memoir, Journal Asiatic Society, Vol. XII.

*Log of the Brig CHARLES HEDDLE, of Mauritius, Capt. FINCK. Copied by Capt. ROYER, Master Attendant at that Port, and translated by HENRY PIDDINGTON. Nautical Time.*

H.	K.	F.	Courses.	Winds.	Lee way	Var.	Friday 21st to Saturday 22d Feb. 1845.
1	5	4	NEbN.	ESE.			Horizon very low ( <i>tres rapproché</i> ,) thick weather all round. Heavy sea, smart breeze, under the large sails, pumped every two hours. Sea and wind gradually increasing, vessel labouring greatly, weather squally, and threatening all round, the squalls very heavy. At 9h. 30' P.M. the main yard went in two in the slings, clued up and furled main top-sail, unbent main-sail, and secured the pieces of the main yard on the booms. In jib, and mizen; scudding under the fore sail, fore top-sail, and fore top mast stay-sail, to wait for day light; heavy squalls and sea. Down main topsail yard, and struck top gallant mast. Noon, in close reef fore top-sail. The gale begins to make itself be felt; scudding under fore-sail, and fore top-sail. Latitude by account 16° 42' S. Longitude account 57° 45' E.
2	5	4		Variable			
3	5	4		to SE.			
4	5	4					
5	6						
6	6						
7	7						
8	7	4	North.	SE. SSE.			
9	7						
10	7						
11	6						
12	6						
1	6	4					
2	6	4					
3	6	4					
4	6	4					
5	6						
6	6						
7	7						
8	8						
9	8						
10	8						
11	8						
12	8						

*Brig CHARLES HEDDLE, Saturday 22d to Sunday 23d February 1845.*

H.	K.	F.	Courses.	Winds.	Lee way	Var.	Remarks.
1	*13	..	WNW.	ESE.			Very bad weather; frightful sea; blowing very hard with incessant rain; vessel taking in seas over the quarter while scudding under the fore-sail, and close reefed fore top-sail. Pumped every hour, vessel labouring greatly from the seas which swept over us. At 2 P. M. perceiving that the head rope of the fore-sail had given way, sent two hands to cut away the earings, and let it come on deck, saved the sail. The fore top mast stay-sail halyards having given way hoisted the sail by a tackle. Gale at its height, scudding right before the wind, as it continually veered round the compass; pumps, attended to; vessel labouring excessively. It being impossible to clue up the fore top-sail without risking severe damage, we resolved to run our chance of what might happen.
2	13	..	NW.	SE.			
3	12	..	NNW.	SSE.			
4	11	..	North.	South.			
5	11						
6	11						
7	12						
8	12	..	NNE.				
9	12						
10	12	..	NE.				
11	12						
12	12						
1	12						N.B. No position is given on this day.—H. P.
2	12	..	E.N.E.				
3	12	..	East.				
4	12						
5	12						
6	12						
7	12	..	ESE.				
8	12						
9	12						
10	12	..	SE.				
11	12	..	SSE.				
12	12	..	South.				
			SW.	North. NE. ENE. East. ESE.	†		

\* *About* is marked in the log.

† These last winds, and courses are so marked in the log, I presume they mean to designate the changes between Noon, and 1 A. M., on the next day, as a memorandum of the gradual veering.

*Brig CHARLES HEDDLE, Sunday 23d to Monday 24th February, 1845.*

H.	K.	F.	Courses.	Winds.	Lee way	Var.	Remarks.
1	12	..	SW.	NE.	..	15	Weather always the same with a frightful sea. Shipping from time to time very heavy seas. One filled the whole deck fore and aft with two feet of water; the larboard waist board carried away, much water going down the hatchways and cabin scuttle, though all secured by tarpaulins. 4 P. M. fore top-sail blew away, scudding under bare poles, the new fore top-mast stay-sail giving way, saved it; two men at the helm, vessel labouring greatly, storm always at the same height, winds veering round the compass from hour to hour, and even in half an hour.*
2	12	..	WSW.	ENE.			
3	12	..					
4	12	..					
5	12	..					
6	12	..	West.	East.			
7	12	..					
8	12	..	WNW.	ESE.			
9	12	..	NW.	SE.			
10	10	..	NNW.	SSE.			
11	10	..					
12	10	..					
1	10	..					Brought all the crew aft into the cabin to be at hand, closed up the fore-scuttle. N.B. No position given on this day.—H. P.
2	10	..					
3	11	..	North.	South.			
4	11	..					
5	11	..					
6	11	..	NNE.	SSW.			
7	11	..	NE.	SW.			
8	11	..	ENE.	WSW.			
9	11	..					
10	11	..					
11	11	..	East.	West.			
12	11	..					

*Brig CHARLES HEDDLE, Monday 24th to Tuesday 25th February, 1845.*

H.	K.	F.	Courses.	Winds.	Lee way	Var.	Remarks.
1	11	..	ESE.	WNW.	..	13	The gale always at the same degree of strength, but the squalls a little heavier, pumps always in hand, vessel making water. All the cabins below wet, the provisions in the great cabin also wet, the vessel making water through every seam in the deck without exception, baled the water out of the cabin by buckets. Shipped several seas which went over all. At two in the morning the vessel broached to, the water two feet deep on the deck. We remained in this dangerous position for about ten minutes, when she righted. We broached to again several times from the speed of the vessel†; cleared the scuppers. At 10 shipped a sea in the fore rigging which carried away jib and flying jib booms. Cut away the wreck to clear the bowsprit. Latitude by a doubtful observation, .... 16° 18' S. Longitude Chronometer, .. 53° 2' 30"
2	12	..					
3	12	..	SE.	NW.			
4	12	..					
5	12	..					
6	11	..					
7	11	..					
8	11	..	SSE.	NNW.			
9	11	..	South.	North.			
10	11	..					
11	11	..					
12	11	..					
1	11	..	SSW.	NNE.			The gale always at the same degree of strength, but the squalls a little heavier, pumps always in hand, vessel making water. All the cabins below wet, the provisions in the great cabin also wet, the vessel making water through every seam in the deck without exception, baled the water out of the cabin by buckets. Shipped several seas which went over all. At two in the morning the vessel broached to, the water two feet deep on the deck. We remained in this dangerous position for about ten minutes, when she righted. We broached to again several times from the speed of the vessel†; cleared the scuppers. At 10 shipped a sea in the fore rigging which carried away jib and flying jib booms. Cut away the wreck to clear the bowsprit. Latitude by a doubtful observation, .... 16° 18' S. Longitude Chronometer, .. 53° 2' 30"
2	11	..	SW.	NE.			
3	11	..	WSW.	ENE.			
4	11	..					
5	11	..					
6	11	..	West.	East.			
7	11	..	WNW.	ESE.			
8	11	..					
9	11	..	NW.	SE.			
10	11	..					
11	11	..	NNW.	SSE.			
12	11	..					

\* The expression is "*faisant le tour du compas d' heure en heure et meme une demi heure*," of which the literal translation would be, "going round the compass from hour to hour and even in half an hour." What is meant is evidently (by the log) that the wind was going round the compass and *changing* every hour or every half hour.

† The words are "*par la vitesse du batiment*." No doubt the difficulty of steering her is here implied.—H. P.

*Brig CHARLES HEDDLE, Tuesday 25th to Wednesday 26th February 1845.*

H.	K.	F.	Courses.	Winds.	Lee way	Var.	Remarks.
1	11	..	North.	South.	..	20	<p>The gale always at the same strength without the least intermission, heavy sea and rain. The tiller ropes gave way, changed them, the bolts also of the tiller having given way, drove in preventer ones.</p> <p>P. S. Every hour. The trusses of the fore-yard gave way, replaced them, scudding under bare poles. The sea frightful, vessel making much water through the deck.</p> <p>Crew worn out with fatigue. The sun appeared indistinctly at noon whereby we obtained an indifferent latitude and longitude.</p> <p>Latitude by indifferent observation, .... .. 18° 02' S. Longitude ditto ditto, .. 51° 2' 30" E.</p>
2	11	..	NNE.	SSW.			
3	11	..					
4	10	..	NE.	SW.			
5	10	..	ENE.	WSW.			
6	10	..	East.	West.			
7	10	..	ESE.	WNW.			
8	10	..					
9	10	..	SE	NW.			
10	10	..	SSE.	NNW.			
11	10	..	South.	North.			
12	10	..	SSW.	NNE.			
1	10	..	SW.	NE.			
2	11	..	WSW.	ENE.			
3	10	..	West.	East.			
4	10	..	WNW.	ESE.			
5	10	..	NW.	SE.			
6	10	..	NNW.	SSE.			
7	10	..	North.	South.			
8	10	..	NNE.	SSW.			
9	10	..	NE.	SW.			
10	10	..	ENE.	WSW.			
11	10	..	East.	West.			
12	0	..	ESE.	WNW.			

*Brig CHARLES HEDDLE, from Wednesday 26th to Thursday 27th Feb. 1845.*

H.	K.	F.	Courses.	Winds.	Lee way	Var.	Remarks.
1	10	..	SE.	NW.			<p>The horizon always obscure though sometimes clearing a little, but the squalls and sea always heavy, pumped every hour. Two men at the helm. Always under bare poles. At 10 P. M. clearing up a little, and we saw some stars, but the sea and wind always heavy.</p> <p>Bent fore top-mast stay-sail, and fore and aft mainsail with two reefs in it. Bent another fore top-mast stay-sail on the fore stay to balance the vessel's sails.*</p> <p>Scudding always according to the veering of the wind.</p> <p>Seeing that we had sustained much damage, and that we were nearer to the Mauritius than to any other place, the Captain resolved to return there, not considering the vessel in a state to continue her voyage.</p> <p>Latitude observation, 20° 12' S. Longitude chronometer, 52° 24' E.</p>
2	10	..	SSE.	NNW.			
3	9	..					
4	9	..					
5	9	..	South.	North.			
6	9	..	SSW.	NNE.			
7	10	..	WSW.	ENE.			
8	10	..	West.	East.			
9	10	..	NW.	SE.			
10	10	..	NNW.	SSE.			
11	10	..	North.	South.			
12	10	..	NNE.	SSW.			
1	10	..	NE.	SW.			
2	10	..	ENE.	WSW.			
3	10	..	East.	West.			
4	10	..	ESE.	WNW.			
5	10	..	SE.	NW.			
6	10	..	SSE.	NNW.			
7	10	..	South.	North.			
8	10	..	SSW.	NNE.			
9	10	..	SW.	NE.			
10	10	..	WSW.	ENE.			
11	10	..	West.	East.			
12	10	..					

\* i. e. When sail should be made, having lost the jib boom.

*Brig CHARLES HEDDLE, Thursday 27th Feb. to Friday 28th Feb. 1845.*

H.	K.	F.	Courses.	Winds.	Lee way	Var.	Remarks.
1	7	..	SE.	ENE.	..	..	The weather becoming fine, bent the fore-sail, and spare fore top-sail, took the main top-sail yard for a main yard, and let the reefs out of the fore and aft main-sail.
2	7	..	SSE.	Variable			
3	7	..	ESE.	to NE.			
4	7						
5	7						
6	6	4					Cloudy still, and lightning in all quarters.
7	6	4					Fine, and sea smooth with a pleasant breeze.
8	6	4					
9	6						Latitude observation, .. 20° 19' S. Longitude chronometer, 54° 29' 28"
10	6						
11	6						
12	6						
1	6						
2	6						
3	6						
4	6						
5	6						
6	6						
7	6						
8	6						
9	6						
10	6						
11	6						
12	6						

I shall notice this log separately, but at present, I proceed to print the remaining documents, so as first to adduce from them the general track of the storm, and then take up the peculiar investigations which this log gives rise to.

*Abridged Log of the Ship APPOLLINE, Captain THOMAS, from the Mauritius, bound to Calcutta. Civil time.*

The Appolline left the Mauritius on the 19th February 1845, with light N. Easterly winds to midnight of that day.

20th February. Winds ENE., East, and variable; at 11 A. M. cloudy suspicious weather, at Noon heavy squall and rain, latitude by account 18° 50', Round Island having borne at 6 A. M. SEbS.\* since when the ship had made 23' NNE. hence the longitude about 57° 50' East. P. M. to midnight squally, moderating and freshening again, wind from NEbE. and East, ship standing from noon to midnight to the NEbN. and NNE.

21st February. A. M. wind ESE. fresh breeze and cloudy, vessel standing to the NEbN. 68' to latitude 16° 52' S. longitude 58° 10' East by

\* Distance not given, or I have omitted it.

account. P. M. Barometer falling, making preparation for bad weather. At midnight brisk gales and cloudy, ship standing to the NE. wind SEbE.

*22nd February.* A. M. wind SEbE. ; by noon blowing a complete hurricane in the squalls. 4 A. M. hove to. P. M. wind marked EbS. weather the same and a cross sea ; at 8, Barometer still falling.

*23rd February.* The same ; heavy gale and rain ; blowing a complete hurricane during the squalls. At 8 A. M. Barometer 28.5, wind marked ESE. to noon, and P. M. SEbE. To midnight, the weather the same.

*24th February.* P. M. wind marked East ; at 8 A. M. blowing a complete hurricane with much rain. Bar.  $28^{\circ} 5'$  ship under bare poles, head to the Northward. P. M. the same. Wind EbN. and at 3, NEbE. At 2 P. M. wore ship to the SE. the weather the same.

*25th February.* At 4 A. M. more moderate, Barometer rose 0.2. At 8 A. M. made a little sail. Noon latitude account  $16^{\circ} 53'$ , longitude  $55^{\circ} 31' E.$ \* and by midnight the weather was moderate.

*Abridged Log of the Ship JOHN ADAM, Captain MANSFIELD, from Mauritius to Calcutta, reduced to Civil time.*

The *John Adam* left the Mauritius in company with the *Sophia*, and at noon, 20th February 1845, was in latitude  $14^{\circ} 36' S.$  longitude  $59^{\circ} 38' E.$  with a fine SE. trade. P. M. the same ; midnight calm.

*20th to 21st February.* A. M. wind ESE., East, and at noon NNE. A. M. squally, no Obs. latitude account about  $12^{\circ} 30'$  longitude  $59^{\circ} 30' E.$

P. M. increasing wind Northerly ; vessel standing to the Eastward, with a high confused sea. 9 P. M. wind NW. course  $NE\frac{1}{2}E.$  4 P. M. Bar. 29.50, made preparation for bad weather. 10 P. M. to midnight hard gales and constant rain. Wind NW. from 9. P. M.

*22nd February.* A. M. moderating, NW. wind, and vessel making sail. accordingly. Noon, no observation, latitude by account about  $11^{\circ} 30'$  ; longitude account  $61^{\circ} 10' E.$  Barometer 29.50, thermometer  $83^{\circ} 10'$  squally and unsettled, wind NW. P. M. to midnight wind NNW. the same weather.

\* Perhaps by Chronometer, worked by the latitude by account.

23rd February. To noon wind NNW. and weather becoming settled, latitude  $16^{\circ} 26'$  S. longitude  $62^{\circ} 44'$  East. Barometer 29.75; thermometer  $80^{\circ} 40'$ .

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*Abridged Log of the Ship SOPHIA, Captain SAXON, from Mauritius to Calcutta, reduced to Civil time.*

The Sophia left Mauritius on the 16th February.—

19th February.—At noon in latitude  $16^{\circ} 4'$  S., longitude  $58^{\circ} 44'$  E., Bar. 29.65. Thermometer  $84^{\circ}$ , and fine weather, with three to five knot breezes, from East to ESE. P. M., decreasing breeze and cloudy to midnight.

20th February.—A. M. winds variable SE. to noon, with squalls and heavy rain. 8 A. M. dark, squally, threatening appearance. Noon latitude observation  $14^{\circ} 40'$  S. longitude  $59^{\circ} 13'$  E. Barometer 29.88. Thermometer  $62^{\circ}$ . P. M. wind Easterly, variable, and NE. Towards 9 P. M. Northerly, and weather very threatening, making preparations for bad weather, at 10-30. P. M. sudden shift to the East.

21st February.—A. M. winds to noon South, SE. East and NE. Noon, heavy squalls and thick rain. Bar. falling, and all preparations for bad weather. Latitude account  $12^{\circ} 51'$  S. longitude  $59^{\circ} 38'$ . Barometer 29.60. Thermometer  $81^{\circ}$ . 1 P. M. tremendous heavy squalls, wind N. Westerly, every appearance of a hurricane. 7 P. M. Barometer 29.30. At 10 P. M. blowing a fresh gale, ship standing to the NE. 7 knots per hour\* with wind at NW. to midnight.

22d February—Midnight more moderate, and Barometer rising. Daylight out all reefs, wind North, latitude noon by account  $11^{\circ} 21'$  S. longitude  $61^{\circ} 00'$ . Barometer, 29.79. Thermometer  $81^{\circ}$ . Weather squally. P. M. weather still thick, but by midnight clear.

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*Abridged Extract from the Log of the Ship RANGER, Capt. STEPNEY, from the Mauritius bound to Madras, reduced to Civil time.*

At Noon 19th February, 1845, the Ranger was in latitude  $13^{\circ} 34'$  S., longitude  $60^{\circ} 20'$ , light winds N. calms with a heavy appearance to the NE. and hazy horizon. Midnight sea smooth, cloudy and squally.

\* The right course in the Southern Hemisphere, for she was on the NE. quadrant of the Storm.—H. P.



*20th February.*—Noon latitude  $12^{\circ} 56'$  S., longitude  $60^{\circ} 53'$  E. light variable South and SE. airs, hazy sultry weather, and *uncommon black squally appearance to the Northward*. P. M. wind veered to the Northward, remaining variable and squally to midnight, and between North and NbE. with calms and squalls and thick dark weather.

*21st February.*—To noon increasing breeze NbE. latitude observation  $12^{\circ} 31'$  S., longitude  $62^{\circ} 00'$  E.

Note, for the last two days a current to the West of about 1 mile per hour.

P. M. Fresh gale increasing to midnight, from North at noon, at 5 P. M. NbE. to NbW. and at 12 North again. Midnight increasing gale and squalls.

*22nd February.*—A. M. to noon fresh gale and hard squalls, the wind *hot and sultry*. At noon, latitude  $12^{\circ} 0'$  S., longitude  $64^{\circ} 3'$  E. Var.  $5^{\circ}$  W. course by observation is EbN.  $\frac{1}{4}$  N,  $127'$ . P. M. to midnight fair.

*23d February.*—Noon light and fine weather, latitude  $11^{\circ} 26'$  S. longitude  $66^{\circ} 18'$  E.

*Abridged Log of the Brig ARPEUTEUR, Captain J. STILLAMAN. Forwarded by Captain ROYER. Reduced to civil time.*

The *Arpeuteur*, with a cargo of bullocks, (from Madagascar?) hove to at 8 A. M. and at Noon *25th February*, it was blowing a hurricane from SE.; she was then in latitude  $18^{\circ} 50'$  S., longitude by chronometer  $53^{\circ} 40'$  E. The main topsail blew from the yard, and she was thus under bare poles. The run for the previous twenty-four hours (nautical) is not marked, but the wind which had been gradually increasing from noon 24th, from ESE. at 10 P. M. is marked SE. to noon 25th. P. M. The same winds and weather to midnight.

*26th February*, A. M.—Wind SSE.; most of the sails blown from the yards, vessel lying to on the larboard tack. At 2-20 P. M. calm, with a heavy sea breaking fore and aft over the Brig. At 3 P. M. the wind came from the NW. and blew with the same force; the squalls heavier till midnight.

27th February, A. M. From 8 P. M. on the preceding day to noon on this day, the wind is marked as blowing all round the compass. At 3 A. M. more moderate; at daylight clear weather, made sail; and at noon, fine. Latitude by observation  $19^{\circ} 11'$  S. Longitude by chronometer  $51^{\circ} 14' 45''$  E.

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*Abridged extract from the Log of the Barque COMMERCE DE BORDEAUX, from Bourbon to Pondicherry. Civil time. Forwarded by Captain ROYER.*

We have fortunately for this vessel's Log a newspaper notice, as follows :

"French bark *Commerce de Bordeaux*\* from Bourbon, the 28th February, bound to Pondicherry, experienced on the 23rd in latitude  $14^{\circ} 37'$  S., and longitude  $54^{\circ} 44'$  E., a hurricane which lasted three days, commencing at SE. and round the compass; lost mizen mast, and main topmast, mainyard, sails and boats."

This gives us the spot where the storm commenced. The vessel lost sight of the Maupertuis at noon 21st, and stood to the N. Eastward with the SE. trade.

22nd February, A. M.—Standing to the N. Eastward. Noon, freshening. P. M. squally weather; wind increasing from SSE.; at 4 P. M. close reefed, and hove to.

23rd February, 1 A. M.—Blowing a gale from SSE.; veering to South at 5 A. M.; and SE. at 8. At 9 A. M. calm; ship not steering. Soon after noon, wind NE. increasing fast; vessel scuds to the SW. 9' per hour. 4 P. M. hurricane. Barometer two lines below "*tempête*."† heavy sea; at 5 "wind is furious." The wind is now described between 5 and 7 P. M. as making the circuit of the compass several times!

At 7 P. M. blowing harder; the fore topmast staysail split, and the vessel broached to, and lay upon her beam ends till  $9\frac{1}{2}$  P. M. when the mizen mast being cut away, and the main topmast going, she bore up; main yard arm is carried away and launch stove. No winds marked from 4 P. M. to 9 A. M.; hurricane at full, and sails blowing from the yards.

\* My copy says, *Courier*. It may be my own mistake or that of the paper, but there is no doubt that this is the vessel, as the damage sustained is the same.

† I do not know what this is; I presume like our own "stormy."

24th February, A. M.—Ship buried in the sea; hurricane as before. At daylight trying to collect the wrecks; the wind continually veering all round the compass, but from 9 to Noon wind is marked ESE., and course WNW. seven miles per hour. P. M. wind marked variable, and going all round the compass; vessel going seven knots. 5 P. M. to 8, the same wind marked as going round, and vessel steering different courses, but weather moderating a little from 9 to 12; the wind always going round the compass.

25th February. Wind at 1 A. M. ENE.\* Vessel's course as SSW. six knots. At 10 A. M. moderating a little: 1 P. M. the same, but still scudding under bare poles to the WSW., and SW. at 10 to midnight.

26th February, A. M.—Scudding under bare poles to the SW., but only four and five knots marked; wind moderating. 9 P. M. the same, but finer weather.

27th February, A. M.—The weather gradually moderating till noon, when it was fine; with the wind at NNE., and NE. from midnight.

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*From the "Cernéen" a Mauritius Newspaper, I have extracted the following notice.*

"The bark *Marie Laure*, experienced on the 24th and 25th ultimo, a heavy gale of wind from the SE. Latitude  $18^{\circ} 20'$  S. and longitude  $53^{\circ} 30'$  E., in which she lost sails and seven bullocks."

I have also had forwarded to me the Log of the ship *Faize Rubahny*, from Calcutta bound to Mauritius, but it unfortunately contains no longitudes, and from the weather and latitudes, I judge her to have been too far to the Eastward to have felt any part of this storm.

I now give a tabular view of the wind and weather from the 21st to 23rd February, as in the former memoirs.

\* No doubt a clerical error, and NNE. is meant, for at 1 P. M. ENE. wind and WSW. courses are again marked.

*Tabular view of the Winds and Weather, 21st to 23rd February 1845, in the Southern Indian Ocean. Civil time.*

Date.	Name of Place or Ship.	Lat. S.	Long. E.	Winds and Weather.	Barometer.	Simp.	Ther.	Remarks.
Noon 21st Feb.	Ranger, ..	12 31	62 00	Fresh gale, increasing to mid- night from Northward, ..	.. ..	.. ..	.. ..	Current to the West.
	Sophia, ..	12 51	59 38	N Westerly 8 P.M. Tremendous heavy squalls, ....	29.60	.. ..	81	Every appearance of a hurricane, 10 P.M. a fresh gale, ship stand- ing to the NE. Barometer on the 20th was 29.88.
	John Adam, ..	12 30	59 30	Squally Noon, wind NNE P.M. increasing from the Northward, 9 P.M. NW.	.. ..	.. ..	.. ..	Midnight hard gale and rain, wind NW. from 9 P.M.
	Appolline, ..	16 52	58 10	Fresh breeze and Cloudy ESE. ....	Falling.	.. ..	.. ..	Midnight brisk gales SE & E, and cloudy, Barometer falling. Ship standing to the NE.
	Charles Heddle, ..	19 14½	57 48	Thick weather blowing fresh ESE. to SE. heavy sea,	.. ..	.. ..	.. ..	Midnight wind SE. running to the North; latitude then 17° 53', longitude 57° 47'.
Noon 22d Feb.	Ranger, ..	12 0	64 3	Fresh North breezes, ....	.. ..	.. ..	.. ..	Midnight fair.
	Sophia, ..	11 21	61 0	Wind North squally, ...	29.79	.. ..	.. ..	By midnight clear.
	John Adam, ..	11 30	60 59	Wind NW. squally and un- settled, ....	29.50	.. ..	83 1	Note, position uncertain.
	Appolline, ..	.. ..	.. ..	Hurricane at EbS. ....	Falling.	.. ..	.. ..	No position given.
	Charles Heddle, ..	16 42	57 45	Hurricane about ESE. ....	.. ..	.. ..	.. ..	Wind not marked at noon, but nearly this

Date.	Name of Place or Ship.	Lat. S.	Long. E.	Winds and Weather.	Barometer.	Simp.	Ther.	Remarks.
Noon 23d Feb.	Ranger, ..	0 11 26	0 66 18	Light breezes and fine weather, ....			0 1	
	John Adam, ..	10 26	62 44	NNW. and settling, ....	29.75	.. ..	80 4	
	Appolline, ..	.. ..	.. ..	A. M. ESE. and P. M. SEbE. heavy gale and rain, ..	28.5. 8 A. M.	.. ..	.. ..	Blowing a complete hurricane in the squalls.
	Charles Heddle, ..	.. ..	.. ..	Hurricane all round the compass, ....	.. ..	.. ..	.. ..	Scudding for the whole 24h.
	Commerce de Bordeaux, ..	14 37	54 44	Hurricane commenced here, ..	.. ..	.. ..	.. ..	See Newspaper notice.

Note. From this day we have only the logs of the *Charles Heddle* and *Appolline*, and on the 25th that of the *Arpenteur*, which are so easily collated that it is not worth while putting them in a tabular form.

## SUMMARY.

The following are the considerations from which the track laid down in the Chart No. 1, has been deduced.

Taking the storm to have originated and come from the Eastward, as we have reason to believe they all do, the most Easterly log we have, which is also the first in point of time, is that of the *Ranger*, which vessel seems, on the 19th and 20th February, to have passed to the Southward of the storm (or of a storm) in between latitudes  $13^{\circ}$  and  $12'$  S., and on the 21st and 22d February, perhaps to have skirted its Eastern edge in longitude  $62^{\circ}$  to  $64^{\circ}$  East. On the 21st we have the *Sophia* apparently running up and passing close to the NE. border of this storm, having had the weather fine on the 19th, and threatening on the 20th, in latitude  $14^{\circ} 40'$  longitude  $59^{\circ} 13'$ , with her Barometer at 29.88. The *John Adam*, in company with her, also with the wind at NW. from 9 P. M. of the 21st and like her standing fast to the NE., and thus out of the storm circle.

To the South we have the *Appolline* and *Charles Heddle* at midnight 21st to 22nd

The *Appolline* with weather announcing an impending gale in about latitude  $16^{\circ} 20'$  the wind being at SEbE. and the vessel standing to the NE. while the *Charles Heddle* had at this time, in latitude about  $17^{\circ} 53'$  longitude  $57^{\circ} 47'$  the wind so heavy at SE. that she was already scudding.

The distance however, is so great between the vessels to the North and those to the South,—for taking the *Sophia* and *John Adam* as close together, and the mean distance between the *Appolline* and *Charles Heddle*'s positions as an opposite point, it will be upwards of six degrees—that we cannot allow them all to have shared in the same storm, particularly as the *Appolline*, though farther North, had not the winds, it appears, so strong as the *Charles Heddle*, so that as I take it these were the preliminary *streams* of wind, to which I have before adverted in former memoirs, which precede as I suppose the formation of a true vortex.\* I have thus only marked the different midnight posi-

\* I have more than once said in the course of these *Memoirs*, that these circular vortices must begin *somewhere* and *somehow*, and have suggested that they do so by *streams* of wind. From Mr. Rechendorf, a German gentleman educated as a mining

tions between these dates for reference, and pass on to Noon of the 22d, on which day we have only the *Charles Heddle* and *Appolline* on the southern side of *their* storm, for they were clearly in the same hurricane. The *John Adam* and *Sophia* were now of course far out of the influence of the threatening weather which they had experienced.

*Centre of 22nd February.*—As the *Charles Heddle*, at noon 22nd, had a hurricane at about ESE., and as we shall subsequently shew, was scudding in a circle of but little more than 60 miles radius, it follows that the centre bore about NNE. 60 or 70 miles, from her position.\* We have not that of the *Appolline* to compare, but we find that she had the wind at E. by S. also blowing a hurricane, and was lying to, and as she could not be far from the *Charles Heddle*, I have placed the centre as it relates to the latter vessel only, which will also give the *Appolline* the wind as she had it, and on about that part of her drift, which is all we can mark for her, at which she was at this time.

*Centre of the 23rd February.*—We have at noon the *Charles Heddle's* position, as near as her corrected run will give it, and find that she was then on the Eastern range of her first circle, having the wind at North, and that this circle (see *post*) was of about 122 miles in diameter, or 61 miles radius; which distance to the West gives the approximate position of the centre of the storm for this day. A circle on the general chart cuts the *Appolline's* drift line to the West, as she was drifting that way, so as to give her a wind at about ESE. between which and SEbE. she had it by log. Her drift for want of data, is marked merely as a straight line, but she might have made more southing, and thus have been further from the centre, though on the same bearing from it, and with the same wind. We find on this day also that the *Commerce de Bordeaux*, first appears to have felt the hurricane, and this agrees well enough as to distance with our centre, which is at 140 miles from

Engineer, I had a curious account of the dust-whirlwinds, several of which in Upper India he had run after and penetrated. He describes them as forming a thick broad wall of dust, through which it was half suffocation to penetrate, but when in the centre it was nearly calm, with nothing but the wall of dust visible. He farther told me, that he had seen large ones commence, and that they did so in segments, which afterwards united. This is exactly our supposed "streams of wind," but then we know not if the causes on shore are the same; there may be two or more causes producing circular atmospheric motion.

\* See however what is subsequently said as to the incurving winds.

her. Unfortunately we have nothing of this vessel's position beyond a bare notice and an imperfect log. The direction of the wind does not agree however very well with her position, the log giving SSE. veering to South, the point from which the hurricane commenced, and our centre shewing SSW. as the wind with her at noon. I think it however not improbable, and indeed most likely, that this vessel had a separate storm, for it is difficult to suppose that she could have fallen into the *Charles Heddle's* and gone through the veerings and scuddings her log shews, without the vessels having seen each other, but an ignorance of where she was when the storm terminated, makes every thing uncertain about her.

*For the centre of the 24th February.*—We have the *Charles Heddle* on the northern periphery of one of her circles, of which on this day the radius does not appear to have exceeded thirty-five miles. She had the wind about WbN. at noon, which places the centre SbW. from her, and this agrees perfectly with the *Appolline's* log, which ship had a furious hurricane at East and EbN. veering to NEbE. or three points, by 3 p. m. or in three hours, which with her low Barometer 28.4, shews she was also very near to the centre.

*For the centre of the 25th February.*—We have the *Charles Heddle* scudding on the West side of one of her circles, with the wind at about SbE., and the radius of the circle about twenty-six miles for this day, the bearing of the centre being therefore EbN. of her. This agrees perfectly with the position of the *Arpenteur*, with which vessel the hurricane begins this day at SE.; our circle making it SE. $\frac{3}{4}$ E. We have not the *Appolline's* wind, and but an indifferent position for her on this day, so that she may well have been a little farther from the verge of the circle than she is marked. The Northerly veering of the wind with her from noon 24th, though without any marked rise of the Barometer till the next day, is exactly what *should* occur with a vessel hove to in her position, and a storm (in the Southern Hemisphere) passing her to the westward.

*For the centre of the 26th February.*—We have the *Charles Heddle* on the NE. quadrant of a circle of twenty-five miles radius, with the wind about NWbW. placing the centre to the SWbS. of her. The *Appolline* had now fine weather. The *Arpenteur*, which vessel had the hurricane from the SE. and SSE. and was hove to, had the wind SSE.



till 2.20' P. M. on this day when it became calm and shifted to the NW. that is to say, the centre passed her (or she drifted across it?) to the eastward of her position at that time.

We have not her position at noon this day, and I have therefore estimated it only, by allowing her to have drifted bodily to leeward at the rate of three miles per hour on a West, WNW. and NW. course, which will give, with variation and a current of 2' per hour to the SW. a course and distance of N. 85° W. 90 miles, which is the best estimation we can make. I have not allowed her the full current which the *Charles Heddle* experienced, because as I shall elsewhere shew, I do not at present\* think it probable, that the effect of the Storm Wave extends strongly to any great distance from the centres, though the storm *Currents* are felt all over the vortex.† The *Arpenteur* certainly did not partake of the *Charles Heddle's* storm wave to the SW. for her position on the 27th is about what a vessel might have been drifted to by the mere effects of the hurricane and storm *Currents*.

*For the log of the 27th February.*—At noon the *Charles Heddle*, though she had made one more turn round her circle since the 26th, appears to have the fine weather commencing, *i. e.* at length to have scudded out of the hurricane; or it might have left her. She appears at noon to have had the wind about EbN. which would give the centre bearing NbW. from her, and I should consider, though the *average* of this day gives but twenty-five miles, yet that by this time, Noon, she was at a much greater distance from it, the weather now beginning so evidently to be fine. We shall thus not be far wrong, if we say that at noon the centre bore NbW. forty-five miles from her; this distance, forty-five miles, being it will be seen, the average distance of the whole five days, and it will be noted on the chart, that this still keeps her, as our averages shew, within about twenty-five or thirty miles of the centre till about six A. M. when she begins to increase her distance from it, so that it is probably very close upon the truth. This position for the centre will place the *Arpenteur*, which also had fine weather returning from 3 A. M., at sixty miles from the centre, with about a SWbS. wind, if she still partook of the same hurricane.

\* I say *at present*, because it is not wholly impossible that this view may be modified. At present all the facts we have, appear to tend to this supposition.

† The reader will find the word *storm wave*, and *storm current* explained in the Eighth Memoir, Jour. As. Society, Vol. XII. p. 398.

There is however one anomaly here, which we must note. In this twenty-four hours, as I have above remarked, the *Charles Heddle* clearly scudded round the last of her circles, between Noon 26th and 5 A. M. 27th, and at the same time, that is, between Noon 26th and 3 A. M. 27th the *Arpenteur*, at an average distance of thirty miles from her, also *drifted* round a circle, having the winds it is said "all round the compass." Now this evidently could not be the same vortex, and we must therefore suppose that, as has been so often shewn before, the storm here divided, which may have been the prelude to its breaking up? I have therefore marked two centres and two circles for the 26th and 27th, and my readers will judge for themselves of the probability of their truth. It is possible however, as the *Arpenteur's* log is but very loosely written, that there may have been only a series of varying streams, not enough to be evidence of a true circle.

We have no data for tracing the storm farther to the Westward, and I shall now advert to its rates of motion as shewn by our centre, and their relation to the *Charles Heddle's* spirals. The rates as shewn by the projection on the chart then, are,

22nd to 23rd	70	Miles.
23rd to 24th	100	"
24th to 25th	115	"
25th to 26th	89	"
26th to 27th	85	"

---

5 ) 459

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Per day      92      Miles.

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Per hour      3.8

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THE LOG OF THE "CHARLES HEDDLE," SEPARATELY CONSIDERED.

*See Plate II.*

So many interesting questions must arise in the mind of every seaman and of every scientific man, though not a seaman, in examining this log and the diagrams which I have given in Plate II, that I have thought it proper to devote a separate section to their consideration. They would almost indeed afford materials for a separate Memoir.

And first let me say, that, writing alike for the seaman and landsman, I shall endeavour to make myself quite clearly understood by the latter, and may thus at times appear prolix, or ostentatious of professional

knowledge; but as this detail is necessary to a thorough understanding of the subject by all, I cannot dispense with it.

The points for consideration then, are—

1. The accuracy of the *Charles Heddle's* log as a whole, and in its parts.
2. The nature and strength of the current she experienced.
3. The construction of the Diagrams in Plate II, from the log.
4. The sizes and probable forms of the vortices round which she scudded on different days, and her distance from the centres.

1. *The accuracy of the Charles Heddle's Log*, may certainly, I think, be taken as being as great as the circumstances would allow. Captain Finck is known at the Mauritius as an experienced and a careful seaman; and to this indeed his log bears full testimony; but there are many circumstances which (on board a merchant ship particularly) would unavoidably induce a less degree of accuracy than on board a man-of-war in like circumstances; and taking it that she was steered as correctly as a vessel could be steered in such weather, and perhaps even from her fine qualities as a sailer *better* than some men of war, the first question in the mind of a sailor is—"Yes; but how often was the log hove in such weather?" We should reply to this, first, that in the hands of many (young) officers, in such weather, and when running from 10 to 13 knots, the common log is *as* liable to error even if it was hove, as the guess of the experienced seaman. We have all known a young, or a careless officer report a ship going nine, when she was going ten knots, and especially at night, when it is not easy for the person heaving the log to have one eye, and a hand to the line, and the other to the holder of the glass, who is often half asleep; or on the other hand, that a fault in paying out the line too fast, or want of quickness at the glass or line may give eleven knots when ten or ten and a half are the truth; and in fact most seamen heaving the log really make their own allowance for any deficiency or excess they may suppose from any cause, and mark the run accordingly. I speak here of the common log only, and not of the patent ones, which are doubtless far more correct. But in the end, one error of our guess or measurement by log corrects the other, and we may, I think, fairly say that, though doubtless in such a hurricane of five days' duration the log was not hove with any regularity, and especially during the night, yet *the average of any day's run* is not far from the truth as to distance? The latitudes as given are the next consi-

deration, and here I think we may fairly reject the latitudes, and consequently the longitudes, given on the 25th and 26th, for it is difficult to suppose between the "frightful sea," (a literal translation) the motion of the vessel, the mere glimpses of the sun obtained in such weather, and often, if any horizon is seen, the difficulty of knowing if it be the true one, that any correct observation could be obtained. For the same reasons also, the hurricane still continuing, I should attach so little faith to the observation of the 26th, that I have preferred rejecting them both, and taking the two positions of Noon on the 22nd and Noon 27th as fixed and well ascertained points, by which to estimate the *average* current experienced for the whole five days; and I think every seaman will agree with me, that this is the safest course as to probability, and consequent approximation to the truth.

## 2. *The nature and strength of the current she experienced.*

When the *Charles Heddle's* log is worked for the whole five days with simply the allowance for variation,\* she will be found to have made good, as noted on the Diagram Fig. I, a course of *North* 42' E. distance 111', in the five days from November 22nd to November 27th; but by her Chronometer and observations she had really made good, as in Diagram Fig. II. a course of *South* 55° W. 366'. So that she must during the five days have experienced a current of S. 52° W. 476 miles! or in round numbers, (which would require 480 miles,) four miles per hour for the 120 hours, or five days, of the hurricane. I have already explained why I should reject wholly the observations on the intermediate days, and this compels us to take the whole as a general average, being without any positive knowledge as to whether its force or direction was different on different days. It is clear that if the direction was

\* There is considerable uncertainty as to the variation in this tract between Bourbon, the Mauritius and the coast of Madagascar. On this last coast it is marked in Norie's Tables, ed. of 1844, which I take to be from the latest authorities, as 16° Westerly at Foul Point, latitude 17½ S.; and as 21° Westerly at Fort Dauphin, in latitude 25° S.; and at Mauritius as 14° 20' West, but we do not know how late this is, and if the variation is increasing or diminishing; and I have not access to any very late works or charts. I have thus allowed 1½ points for the first three days, and 1¾ points for the last two. This may be slightly erroneous, but we do not know any thing as to what may have been errors of steerage, misplacing of compasses, and local variation, and ¼ of a point more or less for a day or two would not make any difference in this kind of circle sailing, as I have satisfied myself by working over the logs of 23d and 24th with 1¼ point variation, when the result for the two days was only three miles South and four East of that given by the variation used, which is quite insignificant either as to general results or the projections of the Chart and Diagrams.

at all different, the force of the current must have been greater, as the distance taken is the straight line between the points, and any deviation from that must make a greater distance. In as far then as *rate* is concerned, we have (supposing the run to be on the whole correctly estimated) taken the lowest.

3. *The construction of the Diagrams in Plate II from the log.*

The seaman will easily understand these (and I hope appreciate the tedious labour they cost), but writing for the meteorologist, and general reader also, I must explain that Fig. 1, is simply the courses and distances of the log corrected for variation, and laid down on a plane chart.

For Fig. II. every *separate* course and distance was first worked as for a traverse, and then to it was applied the average current of S. 55° W. four miles per hour, for the number of hours of run on that course, and this *corrected* course and distance, taken as being the true one, was then laid down; and the result of all these produces from point to point of the five day's scudding, the singular set of spirals shewn in the Diagram!\* And these are in all probability not far from the average truth, as we shall now shew.

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*The size and probable form of the vortices round which the Charles. Heddle scudded.*

There are three kinds of calculations to be made as to the size of the vortices. The first is to take the number of turns made in the *whole* five days against the *whole* distance run by log, and taking this as representing the sum of the peripheries of so many circles as there are turns, the result divided by the number of turns will give the *average* size of the circles, and consequently from their diameters the *average* distance from the centre at which the brig scudded.

The *second* is to consider each *separate* turn or circle made according to the log, with the number of hours employed, and distance run in making it, and to use this to determine the probable Diameter of the circle sailed round; and the *last*, which will perhaps assist us in forming a notion of the shape of the vortices, to take each *half* circle only to calculate from in the same way. I shall shew the result of each of these calculations, premising that I take the circle or half circle to be com-

\* The points marked with dates on the diagram are the positions of the vessel at noon each day; and are those taken for the same days on the general chart also.

pleted at the nearest time and distance to which the log allows us to calculate it.

First, it appears then that from November 22nd to November 27th, the *Charles Heddle* completed as follows :—

	1st Turn in	24 hours,	running	387	Miles.
	1	„	38	„	426
	1	„	23	„	243
	1	„	17	„	167
	1	„	15	„	150
Sums,	5 turns in	117 hours,	„	1373	Miles.
Means are	1 turn in	$23\frac{2}{5}$ hours,	„	$274\frac{3}{5}$	Miles.

The *average* circle then was  $274\frac{3}{5}$ , or say 275 miles in circumference, which would give not quite 90 miles of diameter, and the Brig's average distance from the centre, being the half of this, at about forty-five miles.

Again, five turns of the circle are 160 points, which in 117 hours are 1 point and three-quarters in an hour, and the 1373 miles divided by 160 are 8-6 miles of distance for each course, or chord of each arc. Taking every separate turn we have,

	Diameter.	Distance from the centre.
1st Turn, 387 Miles of circumference, or	123.3	61.6
2nd „ 426	135.5	67.7
3rd „ 243	77.3	38.7
4th „ 167	53.2	26.6
5th „ 150	47.7	23.8
	437.0	218.4
Average,		44.6

Taking every separate *half* turn, which is suggested by the evident tendency of the spirals, and choosing from the log each half circle from WNW. to ENE. by compass,\* and from ENE. to WNW. again, we have first,

\* About, or  $W.\frac{1}{4}N.$  and  $E.\frac{1}{4}S.$  true course, on an average.

			Hours.	Miles.	Circle of	Mean.	Diamr.	Distance from the centre.	
1st turn	22nd	{ 1st half circle.	14	167	334	}	395	125.5	62.7
		2nd	19	228	456				
2.	23rd	{ 1st	12	127	254	}	373	119.	59.5
		2nd	19½	246	492				
3.	{ 24th and }	{ 1st	9½	103	206	}	214	68.	34.
	{ 25th and }	2nd	11	111	222				
4.	{ 25th and }	{ 1st	6	60	120	}	160	51.	25.5
	{ 26th and }	2nd	11	100	200				
5.	....	{ 1st	5½	55	110	}	135	43.	22.5
		2nd	8	80	160				
									204.2

Averaging, 41.

This table gives us then the daily and the average diameters of the circle sailed round on different days from North to South, or thereabouts. The following is the result when we begin with the time (8 P. M. 22d,) at which the vessel was running about North (NNE. by compass) and is thus a measurement from East to West; or at right angles to the preceding one.

Hours.	Circle of	Diameter.	Dist. from centre.
1st Turn, { 1st half circle. 17 — 204 } { 2nd                   18 — 202 }	406	.. 129.2 ..	64.6
2d Turn, { 1st                   19 — 213 } { 2nd               13½ — 148.5 }	361.5	.. 115.0 ..	57.5
3d Turn, { 1st                   11 — 112 } { 2nd                   8 — 81 }	193	.. 61.4 ..	30.7
4th Turn, { 1st                   10 — 96 } { 2nd                   6 — 60 }	156	.. 49.6 ..	24.8
5th Turn, { 1st                   8 — 80 } { 2nd               8 — *80 }	160	.. 50.0 ..	25.0
			<hr/> 202.6
			<hr/> 40.5

The above averages it will be noted are derived from the run by Log.

There is a third average to be derived from the *measurement*, on the Diagram, of the distance between the parallels nearest to the longest, or vertical, or North and South diameters of each spiral on Fig II, which are those nearest the meridians. The transverse (minor) or East

\* This is incomplete: the log of the 27th closing, as before noted, at a West course, and the weather becoming fine; I have therefore *supposed* the latter half of the circle.

and West axes of the spirals, or those bounded by the nearest courses to the meridians *appear at first sight* to be reduced by the effect of the current, and the longer (major) axes also appear reduced by the crossings of the old track from the same cause, but the letters *A* to *B*, *B* to *C*, &c. and *a* to *b*, *b* to *c*, &c. will show the measurements taken, the first being near the meridional, the last near the horizontal distances. Measurements of these parallels are also taken, as in the former case, twice for each circle to obtain a fair average, and are for the vertical axes.

		Mean Diameter.		Mean distance from centre.	
1st.	1st <i>A</i> to <i>B</i> 112	..	110	..	55
	2nd <i>B</i> to <i>C</i> 107	..		..	
2nd	1st <i>C</i> to <i>D</i> 85	..	123.5	..	61.7
	2nd <i>D</i> to <i>E</i> 162	..		..	
3rd	1st <i>E</i> to <i>F</i> 77	..	75	..	37.5
	2nd <i>F</i> to <i>G</i> 73	..		..	
4th	1st <i>G</i> to <i>H</i> 45	..	54.5	..	27.2
	2nd <i>H</i> to <i>I</i> 64	..		..	
5th	1st <i>I</i> to <i>J</i> 47	..	54.	..	27
	2nd <i>J</i> to <i>K</i> 61	..		..	
				Mean.	41.7

When the same kind of measurement is taken between the extreme *meridians* of the spirals, or from east to west, the results are as follows:—

		Mean Diam.		Mean distance from the centre.	
1st Turn,	<i>a</i> to <i>b</i> 92	..	137	..	68.5
	<i>b</i> to <i>c</i> 182	..		..	
2nd Turn,	<i>c</i> to <i>d</i> 89	..	117.5	..	58.7
	<i>d</i> to <i>e</i> 146	..		..	
3rd Turn,	<i>e</i> to <i>f</i> 33	..	55	..	25.0
	<i>f</i> to <i>g</i> 77	..		..	
4th Turn,	<i>g</i> to <i>h</i> 35	..	53.5	..	26.7
	<i>h</i> to <i>i</i> 72	..		..	
5th Turn,	<i>i</i> to <i>j</i> 28				
	<i>j</i> to <i>k</i> *				
					178.9
					44.7

It is evident here that the second half circle is affected by the current which in the run during the first half is against the vessel, diminishing the breadth of the circle, and in the second half is in favor of, and increases it; making thus double the difference. The average however singularly agrees with the others, as will appear in the following general table.

\* Incomplete as in page 725, and the blank cannot be supplied here.



The following is the result of these various modes of estimating the diameters of the Circles, and the average distances from the centre during each revolution sailed by the Charles Heddle.

Date.	Revolution Completed.	By separate turns Average.	Log.		Diagram with correction for current, Fig. II.	
			By half turns, WNW. to ESE.	By half turns, North to South.	By Meridional axes of spirals.	By Horizontal axes of spirals.
		Diam. Dist. from centre.	Diam. Dist. from centre.	Diam. Dist. from centre.	Diam. Dist. from centre.	Diam. Dist. from centre.
	1st	123 61.7	125.5 62.7	129.2 64.6	110 55.	137. 68.5
	2nd	135 67.7	119.0 59.5	125.— 57.5	123.5 61.7	117.5 58.7
	3rd	77.3 38.7	68.0 34.0	61.4 30.7	75. 37.5	55.0 25.0
	4th	53.2 26.6	51.0 25.5	49.6 24.8	54.5 27.2	53.5 26.7
	5th	47.7 23.8	43.— 22.5	50.— 25.0	54. 27.	Imperfect
	Mean Average distance from centre, ....	44.6	41.0	40.5	41.7	44.7
		Mean of the whole by log is	Mean of the first two days by log is			
		by chart, ....	42.0			62.3
			43.2*			60.9
						Mean of the last 3 days by log is 27.9
						by chart, .. 28.2

\* By the whole distance run (p. 724,) and number of turns, the average distance from the centre on the whole five days is 45 miles.

We arrive so near to the same results by all these different modes of calculation, that we can entertain no reasonable doubt that they are not far from the truth, as shewn by the original data, and that the vessel made in round numbers

1. In the first two days, circles of about 125 miles in diameter, and was sailing round at an average distance of  $61\frac{1}{2}$  miles from their centre, the greatest distance being 68 and the least  $57\frac{1}{2}$  miles.

2. That for the last three days she was sailing round in circles of about 56 miles in diameter, and consequently at a distance of 28 miles from the centre, the greatest distance being 39 miles, and the least 25.

It appeared to me also interesting to know for how many hours during these five days each wind blew; so as to obtain an idea of what the total *resultant curve of the winds* was, independent of the run of the ship. I explain these terms. By the total *resultant* of the winds is meant in meteorology the calculating each separate wind during the number of hours it blows in a given time, its direction being in nautical language a course, and the time or number of hours a distance; the strength being always supposed the same (or this may also be used,) and all these courses and distances, (direction and time,) may make a traverse table, of which as usual one course and distance is the result. Thus if in 24 hours we have 9 hours of N.E., and 15 of S.W. wind, the resultant is 6 of S.W. Wind; or the whole atmosphere of the place may be supposed to have moved for 6 hours to the N. E., if the strength of the two winds was always equal. This is the *resultant* of the wind. If instead of the traverse table we project the directions of the wind for courses, and the hours it blew for distances, we shall have a line of some kind, which in this case is a curve, and this is the *resultant curve* of the wind, Now in the run of a vessel scudding under bare poles her run per hour may be supposed to be an indication of the strength of the wind, but then, the course and distance shewn by log becomes the resultant, indicating from which quarter also the resultant wind blew, and this, as shewn already, is to the N.  $42^{\circ}$  E. by the log, Fig. 1. It is true that the vessel being always carried to the S.W. by the current shewn beyond doubt to have existed, this result is not so valuable as it might have been had no current existed, but it nevertheless has appeared to me to be one worth investigating, as giving an

average of winds as prevailing along the track and close to the centre of the storm for the whole five days.

This summary then, is as follows, beginning with the log of the 22nd, 23rd, which is at Noon 22nd by Nautical time, and ending at Noon 27th. The winds being given by compass are corrected for  $1\frac{1}{2}$  point of Westerly variation, to enable the reader better to compare the curve with Figs. I. and II.

Winds.	Per log hours.		Corrected for Var.		Traverse.				
					N.	S.	E.	W.	
North*	..	8	..	NbW $\frac{1}{2}$ W.	..	7.7	..	..	2.3
NNE.	..	4	..	N $\frac{1}{2}$ E.	..	4.0	..	0.4	..
NE.	..	4	..	NNE $\frac{1}{2}$ E.	..	3.5	..	1.9	..
ENE.	..	10	..	NE $\frac{1}{2}$ E.	..	6.3	..	7.7	..
East,	..	7	..	EbN $\frac{1}{2}$ N.	..	2.0	..	6.7	..
ESE.	..	4	..	E $\frac{1}{2}$ S.	..	..	0.4	4.0	..
SE.	..	6	..	SEbE $\frac{1}{2}$ E.	..	..	2.8	5.3	..
SSE.	..	10	..	SE $\frac{1}{2}$ S.	..	..	7.7	6.3	..
South,	..	11	..	SbE $\frac{1}{2}$ E.	..	..	10.5	3.2	..
SSW.	..	7	..	S $\frac{1}{2}$ W.	..	..	7.0	..	0.7
SW.	..	8	..	SSW $\frac{1}{2}$ W.	..	..	7.1	..	3.8
WSW.	..	7	..	SW $\frac{1}{2}$ W.	..	..	4.4	..	5.4
West.	..	9	..	WbS $\frac{1}{2}$ S.	..	..	2.6	..	8.6
WNW.	..	10	..	W $\frac{1}{2}$ N.	..	1.0	..	..	10.0
NW.	..	8	..	NWbW $\frac{1}{2}$ W.	..	7.1	..	..	3.8
NNW.	..	7	..	NW $\frac{1}{2}$ N.	..	5.4	..	..	4.4
120 hours, or five days.					37.0	42.5	35.5	39.0	
						37.0		35.5	
					South.	5.5		3.5W	

Which gives as the resultant wind South  $32^{\circ}$  W. 6.5 (hours) in 120h. or  $\frac{2}{37}$  of the whole time or run, and as the run was in all 137 miles, this would give 74.4 miles, calculated in distance.

\* Nautical men will notice that the vessel is always marked as changing her course *two* points. I suppose she was steered as long as possible with the wind veering a little on the quarter and then the gradual alteration taken as an average, as is often done in cases of squalls of long duration obliging a ship to bear up. At p. 724 it will have been noted that  $1\frac{1}{4}$  point per hour is the average change.

Now the course and distance made, corrected for } N. 42. E. 111.  
variation shewn by the log, is.

That shewn by the average wind is, S. 32° W. for } N. 32. E. 74.4.  
6.5 hour, or

the difference being occasioned by the varying *distances* made in the different times, arising from the varying strength of the wind, and the effect of the current. The result is always of great interest, for it proves that the vessel, to counteract the current, was obliged to run for one-tenth of the whole time, or ten hours *extra* in the SWbW. winds (S. 55° W.), and thus though it does not prove that the wind *was* less strong on the one side (the NW. side) of the storm circle than on the other, it shows that the current *must* have existed to a great extent.

The resultant curve made by the average of these different winds for the whole five days is also worth attention, and I have projected it in Fig. III. taking the hours for distances. If this, and Fig. IV. (which are on a larger scale than the other diagrams,) be considered attentively with them, we may, I think, without presumption say that, as they are the only MAPS OF THE WINDS in such a hurricane yet traced out, so it will, I fear, be long before we obtain such another.

Its form is also that which theoretically we should say it would assume ; for if we suppose a vortex of air of any size moving through the air (like a dust whirlwind) we should imagine it to be liable to be *flattened* in on the foremost, and elongated on the following side, and this ours evidently is. If we suppose that the vortex is not one of independent atoms of air moving forward, but of atoms in their usual places to which a rotatory motion was successively given, like the undulatory movements of particles of water, the same flattening might still occur, though to a smaller degree, and in a different part of the circle.

A somewhat different curve would be shewn by the number of hours of wind in the five days, with the distance run to each, as shewing the *strength* of the wind ; the vessel being for the whole time under bare poles.\* The resultant of this which is projected at Fig. IV. will be that of the three elements, direction, time, and force, and it will also be *the average of all the curves* of Fig. I. The table is as follows,

\* And her resistance operating on a large scale like the counter-spring or weight, and friction of an Anemometer.

and I allow for it the same variation,  $1\frac{1}{2}$  point, as in Fig. III. the  $\frac{1}{4}$  of a point more allowed during the last two days in the log making, as before shewn, no difference worth noting.

*Table of the distance run with each wind.*

	Winds per Log.	Hours.	Corrected for Var.	Distance run with that wind.
12	North, ..	8	.. NbW $\frac{1}{2}$ W.	.. 85
13	NNE. ..	4	.. N $\frac{1}{2}$ E.	.. 40
14	NE. ..	4	.. NNE $\frac{1}{2}$ E.	.. 43
15	NNE. ..	10	.. NE $\frac{1}{2}$ E.	.. 111
16	East, ..	7	.. EbN $\frac{1}{2}$ N.	.. 87
1	ESE. ..	4	.. E $\frac{1}{2}$ S.	.. 57
2	SE. ..	6	.. SEbE $\frac{1}{2}$ E.	.. 65
3	SSE. ..	10	.. SE $\frac{1}{2}$ S.	.. 94
4	South, ..	11	.. SbE $\frac{1}{2}$ E.	.. 109
5	SSW. ..	7	.. S $\frac{1}{2}$ W.	.. 77
6	SW. ..	8	.. SSW $\frac{1}{2}$ W.	.. 89
7	WSW. ..	7	.. SW $\frac{1}{2}$ W.	.. 75
8	West, ..	9	.. WbS $\frac{1}{2}$ S.	.. 100
9	WNW. ..	10	.. W $\frac{1}{2}$ N.	.. 101
10	NW. ..	8	.. NWbW $\frac{1}{2}$ W.	.. 88
11	NNW. ..	7	.. NW $\frac{1}{2}$ N.	.. 71

There are farther considerations arising out of these results. We are much puzzled when we consider a vortex of air simply as whirling round and without any progressive motion, to say whether there would be a centrifugal or a centripetal tendency? or a mere circular one, throughout? or even centrifugal at the circumference and centripetal towards the centre?

The laws of physics would certainly indicate a centrifugal force, and we usually suppose then an attraction to counterbalance this; or again, the mind reverts to the apparently well observed and attested accounts of water spouts and whirlwinds, which all seem to lean to the fact of these small vortices, at least, having rather a centripetal than a centrifugal force; that is, a particle of air or dust in the neighbourhood would be drawn farther and farther inwards. Our present result is evidently to shew this sort of incurving, *and the diameter of the storm was a decreasing one!*

The consideration of Fig. III. in this point of view, leads I think to a practical result of some, or perhaps much importance ; I consider it thus,

We see clearly that from X to Y in Fig III. and from *x* to *y* in Fig. IV. the whole tendency of the winds was to form a *converging* spiral, and not a *diverging* one, or in other words, a circle of which the wind-arrows would turn inwardly and not outwardly.\* Now we can have no manner of doubt I think that this storm was one of those which, as I have previously shewn, is really the case (See Journal, Vol. IX. Coringa hurricane) was contracting in its progress, and not dilating as many do.

*Is it then the case that, when the storm contracts, the wind forms a converging spiral, and E CONTRA if it is a dilating storm, the spiral is a diverging one ?* We are induced to think this highly probable, and apart from the great interest of it to the meteorologist, if we find it to be the case, it becomes of high importance to the accuracy of our investigations, and moreover to the practical application of the Law of Storms for the purposes of the Mariner ; and it is so from the influence which it has on the true bearing of the centre.

An example will best shew this.

If we suppose a contracting storm, *i. e.* one which has a tendency to *diminish* in size as it proceeds, of 320 miles in circumference, each arc from point to point of the compass of such a circle will have a chord of something less than ten miles ; across which we may supposed a scud-ding ship to run with one wind till it suddenly or gradually changes to another. But according to the hypothesis that the contracting storms are composed of winds converging to the centre, and not of arcs of a complete circle, we may suppose that each of these thirty-two winds and the corresponding chords of their arcs, which are the ship's courses, are also, not perpendiculars to a radius from the common centre, like true tangents, but to the radii from a *succession of centres*, which are disposed round the common centre ; in a word, that *they* converge inwardly also, like the wind-arrows on our charts.

In the Northern hemisphere they will probably converge inwardly to the left. In the Southern hemisphere to the right ? How *much* do they converge is the next question ? for its reply will give us this datum. *The allowance we should make to ascertain the true bearing of the centre in projecting, and even in estimating its position at sea.*

\* Our figure approaches to the volute of an Ionic capital.

It may be possible to estimate this ; approximately at least.

Let us take our circle of 320 miles, and consider the chords of the wind arcs in a *true* circle as forming a polygon of 32 sides, or points.

Now in our Fig. III. the amount of incurving at the two points is about seven miles for an average circle, say, of forty-five miles.

The diameter of our circle of 320 miles is (in round numbers always) 102 miles, so that, at this rate of incurving, we may say that the total would be in the same proportion, sixteen ; *i. e.* 45 : 7 : 102 : 16.

Now sixteen for 32 points is exactly half a mile for each point, and the chord of each arc of one point is 10-5. An incurving of half a mile in such an arc would give about 5°, or say half a point.

In a circle of 200 miles in diameter, on which a ship would only be at 100 miles from the centre (at which time in our Bay of Bengal and China Sea Hurricanes a storm is usually fully and unequivocally manifest) the whole incurving would be thirty miles ; let us say thirty-two, or a mile for each point.

Now the incurving of a mile to each point would make a difference on each arc of about 3° only in the direction of the chord, or say a quarter of a point : so that here it would not make much difference. But we may suppose that the incurving is double what we have here assumed, or even more ;\* and then the difference as to the bearing of the centre might be a point, *i. e.* a vessel in the Northern hemisphere with a hurricane commencing at East, would have the centre bearing, not South but SbE. from her ; and if we suppose this on a circle of 320 miles circumference as before, this would for our purposes, in protracting the winds and ship's place for the centre, make it rather more than 10 miles to the Eastward of its situation if there was no incurving ; and if we again estimated this centre by the cross bearing from the winds of another ship on the Eastern edge of the same circle having the wind at South and the centre supposed to bear (without allowance for incurving) West, it would really bear *with* this allowance of the incurving WbS. and the position found by these allowances for the incurving winds would be 14 miles to the SE. of that shown without it !

I think this may often account for many of the discrepancies we have found in reconciling the ship's positions, winds, and bearings of the centre.

\* Is the rate of veering of the winds (in this case, see p. 724, 1¼ point per hour) any index to the amount of incurving ?

At present it is of course a mere theory, but the fact on which it is based, viz., the average incurving tendency of the winds in the *Charles Heddle's* storm seems fairly enough elicited, and to call for close attention.

Like all theories it will serve us as a torch and a partial guide for the present, and we must wait for more facts, to show if it be well founded.\*

If (for the sake of hypothesis only) we admit this incurving of the winds, it follows that there may be also, not a single incurving of the same rate throughout the whole breadth of the storm, but that the incurving may be much more excessive, and amount to two or three points when the centre is nearly approached, and even be *so violent at the centre as to prevent ships drifting out of it?* just like the vortex of a whirlpool or a tide-eddy, which last we know will often give a boat's crew a heavy pull, or a ship much trouble, before they get out of them. Does it not seem that we have here the explanation of how some ships, as in the case of the *Runnimede* and *Briton* in my last memoir, may be blown and drifted round and round, without drifting *out* of the fatal centre, which we should look for them, nautically, to do, and which other ships there is no doubt really do. An excessive incurving of the winds towards the centre, like the wind-arrows at the centres of Fig. III. and IV. is one, and one very likely method of accounting for vessels remaining in this hopeless state, and moreover it may assist us in supposing how some dismal losses have occurred whilst other ships in company have escaped. It adds also a most powerful argument, if any were wanting, for every precaution to avoid the centres—and for every one who can contribute to these researches to do so.

It is possible that at some periods of a storm, the state of it may be such that there is a centrifugal tendency at the circumference, and an incurving or centripetal tendency near the centre, and that at some point in the whole zone of the storm the winds are blowing in a true circle? All this is matter of high interest to us, and for future careful research. I have perhaps been prolix in this section, but if I have been so, I trust it will be attributed to my anxious desire

\* I may notice here, that in my Third Memoir, Journal As. Society, vol. ix. p. 1047, in noticing the anomaly of the *George and Mary's* log, I have suggested theoretically that the storm *might* have divided. We have since abundant proof, that this frequently occurs in the Bay of Bengal, as seen in succeeding memoirs.



Plate I

TO THE THIRTEENTH MEMOIR

# Law of Storms

IN INDIA

being

## The Charles Heudeley Hurricane

NEAR THE MAURITIUS

24<sup>th</sup> to 27<sup>th</sup> Feb

1841

BY

Henry Piddington

27<sup>th</sup> to 30<sup>th</sup> Feb 1841

27<sup>th</sup> to 30<sup>th</sup> Feb 1841

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27<sup>th</sup> to 30<sup>th</sup> Feb 1841

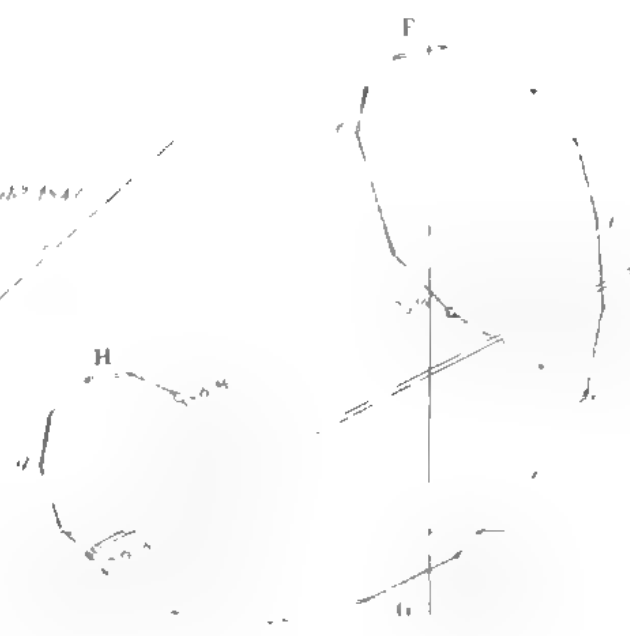




Fig I  
Track  
of the Charles Heddle  
corrected for Variation only  
22<sup>nd</sup> to 27<sup>th</sup> Feb<sup>y</sup>  
1845

Course & Dist<sup>y</sup> P<sup>t</sup> 1 to

Scale 30<sup>mi</sup> to an inch



Centre 27<sup>th</sup>

Scale of 30 to an inch

From Feb<sup>y</sup> 22<sup>nd</sup> to Feb<sup>y</sup> 27<sup>th</sup>  
Lat obs<sup>d</sup> 16° 42' N Lat obs<sup>d</sup> 20° 12' N  
Long obs<sup>d</sup> 74° 45' E Long obs<sup>d</sup> 52° 24' E

Course and Distance to Centre N 56° W 50<sup>mi</sup>

Plane Chart  
of the  
True courses and distances  
made good by the  
Brig Charles Heddle  
in the  
MAURITIUS HURRICANE  
of 22<sup>nd</sup> to 27<sup>th</sup> Feb<sup>y</sup>  
1845

By Henry Piddington

Fig III

Resultant curve of the total of the winds in time  
22<sup>nd</sup> to 27<sup>th</sup> Feb<sup>y</sup> 1845 5 Days - 120 hours  
Scale 20<sup>mi</sup> to an inch Variation allowed 1 Point

Fig IV

Resultant curve of the total of the winds in time  
and distance 22<sup>nd</sup> to 27<sup>th</sup> Feb<sup>y</sup> 5 Days  
Scale 200 Miles to an inch Variation allowed 1 P<sup>t</sup>



to urge the subject on the minds of others, and to elicit their views as well as my own.

### *Conclusion.*

Every man and every set of men who are pursuing the investigation of any great question, are apt to overrate its importance ; and perhaps I shall only excite a smile when I say, that *the day will yet come when ships will be sent out to investigate the nature and course of storms and hurricanes*, as they are now sent out to reach the poles or to survey pestilential coasts, or on any other scientific service ; and it is hoped that England will in this, as in every other nautical investigation, take the lead, and that without waiting till some astounding misfortune shall force the investigation upon us. Nothing indeed can more clearly shew how this may, with a well appointed and managed vessel be done in perfect safety, than the experiment which the foregoing pages detail ; performed by mere chance, by a fast sailing colonial brig, manned only as a bullock trader, but capitally officered, and developing for the seaman and meteorologist a view of what we may almost call the *internal* phenomena of the winds and waves in a hurricane,—and these as mathematically proved as the nature of things will allow,—which we could scarcely have hoped ever to have obtained. The importance of the questions which arise when storms are considered in any of their relations, in war or in peace, to a great Naval and Commercial Nation, and to mankind in general, cannot I think now be doubted.\*

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\* While correcting this page for the press, we receive an account in the Newspapers of the dismal catastrophe of the loss of the Emigrant ship *Cataruqui*, at the entrance of Bass' Straits, in which 414 souls have perished in the prime of life ! This vessel was evidently on the Northern side of a rotatory gale, and swept, in all human probability, by the storm wave, as in the analogous cases in the British Channel, far to the Eastward of any supposed possible drift.

*Account of the Esafzai-Affghans inhabiting Sama (the plains,) Swat, Bunher and the Chamla valley, being a detail of their clans, villages, chiefs and force, and the tribute they pay to the Sikhs. By Shekh Khash Alee, a follower of the fanatic Syud Ahmed. Prepared in 1837 under the instructions of Major R. Leech, C. B. Late Political Agent, Candahar.*

[NOTE.—In Conolly's notes on the Eusofzye tribes of Afghanistan, Journal Asiatic Society, No. 105, 1840, page 932, it will be seen from the conclusion of the above paper, that it was but the intended commencement of a series; his object being to follow it up with a narrative of his journey in the Eusofzye country in January 1840. Will no one consent to supply what he has left incomplete?]

Name of Clan, (Tuppay.)	Name of Village.	Name of Chief, (Malik.)	Number of Matchlock men.	Amount of annual tribute paid to the Sikhs.
SAMA, (THE PLAINS.)				
Aba khel, ..	Zaida, ..	{ Arsala Sadozai, who has been made by the Sikhs, chief of } the Esufzais, ..	800 foot.	
Sapoo khel, ..	Ditto, ..	Sarroo, Sahabee, Omer, and Lushkar, ..	60 horse.	
Maka khel, ..	Ditto, ..	Raheem and Sargund, ..	200 foot.	
Oosee khel, ..	Ditto, ..	Kaim, Kaboot, Humeer, and Sar Ally, ..	40 "	
Tajoo khel, ..	Haryam, ..	Faiztullah, ..	200 "	
Ditto, ..	Sala, ..	Sayad, ..	50 "	600 Rs.
Ditto, ..	Nabee, ..	Najem, ..	50 "	1,100 "
Ditto, ..	Dekee, ..	Sarkan, ..	60 "	500 "
Apa khel, ..	Lahour, ..	Sargand, Attia Mahommad, and Ajab, ..	60 "	400 "
Doulat khel, ..	Kunda, ..	Asraf, Namdar, and Kaloo, ..	1100 foot.	{ 1,500 "
Ditto, ..	Shah Mansoor, ..	Husanally, Kaloo, Ahmed and Sahabzada, ..	20 horse.	20 "
Aba khel, ..	Hind jageer of Aisulla, ..	Ahmed and Fatteh, (formerly Ameer,) ..	100 foot.	1,000 "
Ditto, ..	Kaddee, ..	Ameer Shah Pusund and Hotee, ..	200 "	1,000 "
Ditto, ..	Panch Peer, ..	Munaim, Juhangeer, and Molassam, ..	60 "	
Omar khel, ..	Opai, ..	Ibrahim, Ismail, Biland and Seefut, ..	80 "	1,000 "
Bizad khel, ..	Kalabut, ..	Dilas, Feroz and Mer Ally, ..	72 "	
Ditto, ..	Kala, ..		200 "	100 "
			80 "	500 "

## SAMA, (THE PLAINS.)—(Continued.)

Name of Clan, (Tuppay.)	Name of Village.	Name of Chief, (Malik.)	Number of Match- lock men.	Amount of annual tri- bute paid to the Sikhs.
Omar khel, ..	Darra, ..	Bahadur, Litaif, and Peer, ..	80 foot.	500 Rs.
Ditto, ..	Swahce, ..	Omar, Chundun and Kasam, ..	80 "	800 "
Ditto, ..	Meneree khel, ..	Nawas, Mousum, Mohtum, Abdulla, and Jahangeer, ..	500 "	{ 1,500 " Jageer to Arsala.
Bizad khel, ..	Bajar, ..	Saleem, Jan, Nazalla, and Nousher, ..	50 "	1,000 Rs.
Ahmed khel, ..	Marghoz, ..	{ Shahzada, Futeh, Khai-rulla, Saibaud, Ibrahim, Sajangdad } and Sanamaz, ..	250 "	300 "
Beet khel, Meer Ahmed } khel, ..	Ler munara, ..	Vahabzida, Toorebaz and Abeed, ..	100 "	{ 604 " formerly Jageer.
Ditto, ..	Baja, ..	Maizulla and Nouseree, ..	50 "	1,000 Rs.
Bam khel, Khudoo khel, ..	Bara marghoz, ..	Noor and Darasha, ..	60 "	3,000 "
Budula khel, ..	..	Hasan, Bizad, and Jahan, ..	70 "	3,000 "
Eentoos khel, ..	..	Abee, and Nouseree, ..	60 "	3,000 "
Zafur khel, ..	..	Enayutulla, Abdulla and Turah, ..	70 "	3,000 "
Mada khel, ..	..	Jahangeer, ..	25 "	3,000 "
Kasim khel, ..	..	Guzun, ..	60 "	3,000 "
Osman khel, ..	..	Hasan, ..	25 "	3,000 "
Moosa khel, ..	..	Sahabzada, Nouseree, Zahurdust, and Samud, ..	200 "	3,000 "
Meer Ahmed khel, ..	Tankooee, ..	Shekh, Rahmut, Sahbaz, Abbas, Mawallee, and Abdulla, ..	400 "	3,000 "
Kanazais Alazais, and } Ootmanzais, ..	Kota, ..	Maiznlla, Mukarab, Zabardust, and Mahommad, ..	300 "	300 Rs.
Ootmanzeis, ..	Mainee, ..	..	..	..
Ootmanzais, of Topee, ..	..	Serzaman, Ahmed Ally, and Hussun Ally, ..	100 foot.	..
Nekazais, ..	..	Kaim and Adam, ..	100 "	..
Ala zai, ..	..	..	..	..
Karca zai, ..	..	..	..	..

## SAMA, (THE PLAINS.)—(Continued.)

Name of Clan, (Tuppai.)	Name of Village.	Name of Chief, (Malik.)	Number of match-lock men.	Amount of annual tribute paid to the Sikhs.
Ootmanzais, ..	Pehood, ..	Ootmanzais, ..	40 foot.	
Ditto, ..	Munara, ..	Khairulla, Sarbiland, Nazoo and Aly, ..	200 "	3,000 Rs.
Allezai, Kanazai and {	Beeree, ..	Rahmut, Sarfraz, Kareemdad and Ghulam, ..	150 "	500 "
Ootmanzai, ..				
SIRDAR FUTTEH KHAN.				
<i>Khudoo Khel.</i>				
Bam khel, ..	Tentale, ..	Sarkar, ..	100 foot.	
Osman khel, ..	Dagai, ..	Bahram kheda Sukar and Samad, ..	100 "	
Mada khel, ..	Khalee kilee, ..	Asamaly, ..	50 "	
Mada khel & Badalla khel, ..	Gurgushtee, ..	Mohumud and Zahitta, ..	50 "	
Kasim khel, ..	Kasim khel, ..	Zahif, ..	60 "	
Osman khel, ..	Panchtar, ..	Sardar Fattah, ..	450 "	
Kasim khel, ..	Ditto, ..	Subhan Shah, ..	40 horse.	
Osman khel, ..	Dakada, ..	Sayad Shah and Chundun, ..	40 foot.	
Kasim khel & Osman khel, ..	Damaner, ..	Faizulla, ..	100 "	
Bam khel, ..	Dargalee, ..	Zaman, ..	50 "	
Osman khel & Bam khel, ..	Gazee kot, ..	Habeeb and Huzrut Noor, ..	100 "	
Ditto, ..	Chinjlee, ..	Mubarak, Mursalia and Maddat, ..	100 "	
Bam khel, ..	Ditto, ..	Musulla, ..	300 "	
Kasim khel, ..	Swahce, ..	Dotam and Kazal her, ..	150 "	
Bam khel, ..	Dadar, ..	Akhsar, ..	80 "	
Syuds, ..	Mangal Thana, ..	Sayud Jan Shah and Sayud Akhbar, ..	60 "	
Ditto, ..	Kangalee, ..	Sain Meer Shah, ..	100 "	
Bizad khels, ..	Kalan, ..	Khan Baz, ..	50 "	
Ootman khels, ..	Kaya, ..	Hameed Moosa khel and Azeez Ghulam khel, ..	500 "	





## SIRDAR FUTTEH KHAN.—(Continued.)

Name of Clan, (Tuppay.)	Name of Village.	Name of Chief, (Malik.)	Number of match-lock men.	Amount of annual tribute paid to the Sikhs.
Mada khels,	Maira, ..	Sayud Ghulam, ..	200 foot.	
Ditto, ..	Sona, ..	Zain, ..	600 "	
Ditto, ..	Maza kot,	Salakhee, ..	500 "	
Hauzais, ..	Tuhara, ..	Sahbedad, ..	100 "	
Ditto, ..	Maidan, ..	Mahboob and Takel, ..	200 "	
Ditto, ..	Kinara, ..	Mahboob, ..	50 "	
Ditto, ..	Khan karoon,	Hasan Ally, chief of all the Hassanzai,	400 "	
Ditto, ..	Kadar, ..	Meer Ally, ..	300 "	
Kamalzais,	Hoottee, ..	Ahmed and Azee khel,	100 "	
Ditto, ..	Ditto, ..	Kadeer, ..	100 "	
Namal khel,	Ditto, ..	Mouza, ..	100 "	
Mudoo khel,	Ditto, ..	Mahomed, ..	100 "	
Azee khel, ..	Ditto, ..	Fakeer, ..	100 "	
Ditto, ..	Mardan, ..	Sayad Shah, Hamza and Faizulla,	300 "	
Ditto, ..	Boghdad, ..	Jamal, ..	100 "	
Ditto, ..	Gaddar, ..	Hasan, ..	200 "	
Ditto, ..	Gujar gaddee, ..	Ibrahim and Ramhaz, ..	300 "	
Ditto, ..	Fatama, ..	Nizam, ..	50 "	
Ditto, ..	Saidabad, ..	Faiz, ..	400 "	
Ditto, ..	Peerabad, ..	Abdulla, ..	400 "	
Azee khels, ..	Toroo, ..	Avsee and Peeroo, ..	500 "	3,000 Rs.
Kamalzais	Ditto, ..	Sardar Kadur, ..	200 horse.	
Kawan khel,	Ditto, ..	Omar, ..	100 foot.	
Boosee khel,	Ditto, ..	Baidulla, ..	100 "	
Sadee khel,	Ditto, ..	Lashkar, ..	100 "	
Amoo khel,	Ditto, ..	Saifulla, ..	100 "	
Mancee khel,	Sahamatpoor, ..	Lashkar and Akar, ..	100 "	
Amar khel,	Ditto, ..	Sahdad, ..	50 "	
Sadee khel,	Ditto, ..	Sargand, ..	60 "	
Kambar khel,	Ditto, ..	Dundi, ..	50 "	
Aka khel, ..	Ditto, ..	Hamza khan, ..	50 "	3,000 Rs.

## SIRDAR FUTTEH KHAN.—(Continued.)

Name of Clan, (Tuppay.)	Name of Village.	Name of Chief, (Malik.)	Number of match-lock men.	Amount of annual tribute paid to the Sikhs.
<i>Amazais.</i>				
Ismael khel,	Garee kapoorkey,	{ Sardar Nasuroolla, Gasoo, Kadeer, Noor Mahomed Shuja- hat, Abdulla and Azeez, .. .. . }	600 foot.	
Ditto,	Ghumat, ..	Muzafur, .. .. .	100 "	
Ditto,	Kot, ..	Ashraf and Nazam, .. .. .	100 "	
Ditto,	Doulatzai,	Hasen, .. .. .	300 "	
Ditto,	Ditto,	Haseem, Shah Mahomed, Mahomed and Habeeb,	300 "	
Doulatzais,	Kot, ..	Kamal and Sunni, .. .. .	50 "	
Ditto,	Bargadee,	Hakim, Kaboot, and Annal, .. .. .	200 "	
Ditto,	Sarbazgad,	Daroo Sarwar and Maitul, .. .. .	200 "	
Ditto,	Ala dher,	Mubarak and Mahommed Hussan, .. .. .	100 "	
Ismaizais,	Bashk aly,	Julal, Sardar Mahommed and Lushker, .. .. .	250 "	
Ditto,	Gujar, ..	Mahomed and Ayaz, .. .. .	100 "	
Doulatzais,	Ooriya, ..	Sirdar Munsoor and Yakooob, .. .. .	100 "	
Ditto,	Machaiee,	Kalum, Ashraff, Mahomed and Bulduh, .. .. .	300 "	
Ismaizais,	Soodheree,	Hazrat Shah, Bawar Shah, .. .. .	200 "	
Ditto,	Bazar, ..	Ashraf, .. .. .	100 "	
Ditto,	Bareegool,	Mahomed, .. .. .	200 "	
Ditto,	Kavtar pan,	Awayat, .. .. .	100 "	
Ditto,	Ali dher,	Mouzum, .. .. .	100 "	
Ditto,	Noor aly,	Oobe, .. .. .	100 "	
Ditto,	Chair gulai,	Noor Yar and Momim, .. .. .	200 "	
Ditto,	Hamza kot,	Meer, .. .. .	50 "	
Ditto,	Cheena, ..	Awat, .. .. .	100 "	
Khidrzsais, Bara khels,	Sema, ..	Meer Shikar, Ataee, Anand, Mahomed and Raheem, .. .. .	1000 "	3,000 Rs.
Khidrzsais,	Tulandai,	Sardar Raham, Meer Ally and Mohummud Deen, .. .. .	300 "	3,000 "
Ditto,	Akoova, ..	Ahmed and Zaman, .. .. .	200 "	
Ditto,	Khaleel kilee,	Ahmed, .. .. .	100 "	
Ditto,	Hamza dher,	Noor Shah, .. .. .	100 "	
Aka khel, ..	Imaila, ..	Sirdar Lushkur khan, Ahmed Ibrahim Zafur and Sheo Jang, .. .. .	400 "	
Ditto,	Deena, ..	Peer, Balola and Ibrahim, .. .. .	500 "	

## SIRDAR FUTTEH KHAN.—(Continued.)

Name of Clan, (Tuppay.)	Name of Village.	Name of Chief, (Malik.)				Number of match-lock men.	Amount of annual tribute paid to the Sikhs.
Aka khel, ..	Bazar, ..	Ibrahim, ..	..	..	..	200 foot.	
Ditto, ..	Meer Aly, ..	Lashkar, ..	..	..	..	100 "	
Ditto, ..	Nai Kilee, ..	Nadur Surwar and Balo, ..	..	..	..	300 "	3000 Rs.
Ditto, ..	Sota, ..	Penda, Sher Ally, ..	..	..	..	200 "	
Malakzais, ..	Yar Husen, ..	Arab shah, Zamin shah, Ahmed khan and Mahmood khan, ..	..	..	..	1000 "	
Ditto, ..	Dhohyan, ..	Fatteh, ..	..	..	..	200 "	
Ditto, ..	Taracheena, ..	Meer, ..	..	..	..	300 "	3000 "
Maneezais, ..	Khazana, ..	Sardar Zatur, Ally Sher, and Sardar, ..	..	..	..	400 "	
Ditto, ..	Dagai, ..	Kabeer, ..	..	..	..	200 "	
Ditto, ..	Narjee, ..	Futteh, ..	..	..	..	200 "	
Ditto, ..	Tarkar, ..	Asad, ..	..	..	..	300 "	
Ditto, ..	Ispeen kanee, ..	Mahomed Ally, ..	..	..	..	100 "	3000 "
Mahomedzais, ..	Akooba, ..	Sardar Jahan Abdulla and Meer, ..	..	..	..	300 "	
Ditto, ..	Kaloo khan, ..	Sujut, ..	..	..	..	100 "	
Ditto, ..	Mankot, ..	Gawar, ..	..	..	..	100 "	
Ditto, ..	Sappoo gadee, ..	Ikram, ..	..	..	..	50 "	
Ditto, ..	Gulama, ..	Mohamed Deen, ..	..	..	..	200 "	
Ditto, ..	Baisa, ..	Deena, ..	..	..	..	50 "	
Ditto, ..	Sher Derra, ..	Asad, ..	..	..	..	150 "	3000 "
Total horse, ..							420 "
Total foot, ..							28,412 "
Total tribute, ..							42,200 "
SWAT.							
Durrus khel, ..	Talak, ..	Mahomed khan, ..	..	..	..	200 foot.	
Ditto, ..	Chapryal, ..	Gafar Ghulam and Satar, ..	..	..	..	300 "	
Ditto, ..	Ageel, ..	Shah Azam and Timour, ..	..	..	..	150 "	
Ditto, ..	Lalapoor, ..	Jawahir and Ram, ..	..	..	..	200 "	
Ditto, ..	Sakha, ..	Shah Jyzat, Pende and Sikunder, ..	..	..	..	200 "	

Name of Clan, (Tuppav.)	Name of Village.	Name of Chief, (Malik.)	Number of match-lock men.	Amount of annual tribute paid to the Sikhs.
Durrus khel, ..	Kalakot, ..	Ghulam, ..	50 foot,	..
Mahomed khel, ..	Dewal, ..	Abdulla and Moheen, ..	250 "	..
Ditto, ..	Zerdoul, ..	Salamut Baidulla and Noor Mahomed, ..	150 "	..
Ditto, ..	Salagram, ..	Ibrahim, ..	90 "	..
Ditto, ..	Ala dher, ..	Noorulla and Meer Hassan, ..	150 "	..
Ditto, ..	Baidarra, ..	Meer and Kamardeen, ..	250 "	..
Ditto, ..	Sanabat, ..	Mouza, ..	150 "	..
Khajja khel, ..	Gulceebagh, ..	Ahmed, Yar and Ameer, ..	300 "	..
Ditto, ..	Garra, ..	Dabhosee and Shah Alam, ..	150 "	..
Samozai, ..	Bargadhee, ..	Ahmed, ..	150 "	..
Ditto, ..	Soneepoor, ..	Sagee, ..	50 "	..
Ditto, ..	Banakal, ..	Zaidulla and Arsulla, ..	150 "	..
Ditto, ..	Aboozai, ..	Peerz and Walee, ..	200 "	..
Ditto, ..	Durust khel Bala, ..	Meer and Gulfaraz, ..	150 "	..
Ditto, ..	Ditto, ..	Zer Bazdar and Hubeeb, ..	500 "	..
Ditto, ..	Saroona, ..	Kaloo, ..	100 "	..
Ditto, ..	Saroona tatte, ..	Mahomadee, ..	100 "	..
Ditto, ..	Takoo, ..	Lal, ..	100 "	..
Ditto, ..	Takoo tale, ..	Ameen, ..	100 "	..
Ditto, ..	Namgeer, ..	Abe, ..	100 "	..
Bar Bam khels, ..	Bam khel, ..	Rastum and Shah Walee, ..	300 "	..
Ditto, ..	N oneepoor, ..	Shah and Mohamed, ..	500 "	..
Ditto, ..	Sanapat, ..	Husen and Ghulam and Ahmed, ..	700 "	..
Ditto, ..	Kharetee, ..	Raheem Obaid and Abdulla, ..	500 "	..
Nikee khels, ..	Nikee khel, ..	Ikram, Maddat and Kachoo, ..	..	..
Ditto, ..	Zer, ..	Mohamed, Nunutaz and Muharam, ..	500 "	..
Ditto, ..	Eesa khel, ..	Mahomed and Sahhaz, and Sahzada, ..	400 "	..
Ditto, ..	Khaha, ..	Asaee, Shah Mahomed, Mahomed Shah and Backat Shah, ..	500 "	..
Ditto, ..	Zer dheree, ..	Ataee Mahububat and Kudrat, ..	300 "	..
Ditto, ..	Bar dheree, ..	Abdulla, Myan and Khairulla, ..	400 "	..

## SWAT, — (Continued.)

Name of Clan, (Tuppary.)	Name of Village.	Name of Chief, (Malik.)	Number of match-lock men.	Amount of annual tribute paid to the Sikhs.
Nikee khels,	Salakee,	Nachama and Ataee, ..	300 foot.	..
Bar Bahoozais,	Kesawar,	Nasee, Jalal and Jamal, ..	500 "	..
Ditto,	farree, ..	Naseer, Sher, Mahulla, and Habeebulla, ..	400 "	..
Ditto,	Pesheen,	Nandar, ..	100 "	..
Ditto,	Banpoor,	Gazan, ..	100 "	..
Ditto,	Sagulpoor,	Saloo, Soolleman, and Shah Habeebulla, ..	500 "	..
Ditto,	Jamal, ..	Azeem, ..	100 "	..
Ditto,	Kukura,	Kadeer, ..	100 "	..
Ditto,	Deyra, ..	Mahommad, ..	200 "	..
Ditto,	Pana,	Jan Mahomed,	200 "	..
Ditto,	Shah Alam,	Mahboob Myan,	200 "	..
Ditto,	Bar dher,	Najeab, ..	100 "	..
Soluzais,	Munara,	Faizulla, ..	200 "	..
Ditto,	Gala, ..	Abdulla, ..	100 "	..
Ditto,	Bareekot,	Abdulla Raheemalla and Kama, ..	400 "	..
Ditto,	Abooa, ..	Raheem, Hazrat and Khilat, ..	500 "	..
Ditto,	Kot gram,	Mazulla and Ibrahim, ..	400 "	..
Ditto,	Hodhee,	Sarool, Kareemulla, Raheem and Hussan, ..	400 "	..
Ditto,	Balgeeram,	Najeab, Hussun, and Izzut, ..	400 "	..
Ditto,	Sakara, ..	Noor and Abeed, ..	300 "	..
Ditto,	Bakhta, ..	Myan and Ahmed, ..	400 "	..
Baizais,	Thana, ..	Kabil, Masee Khamilla, and Abdulla, ..	700 "	..
Ditto,	Bazdarra,	Yar, Malak, Meer, and Sargand, ..	300 "	..
Ditto,	Kotal, ..	Mahulla and Khoj, ..	200 "	..
Ditto,	Lund Khood,	Mosam, Naseem, and Zaidoo, ..	500 "	..
Kanzai,	Totakan,	Abdoo and Mohamed Deen, ..	200 "	..
Ditto,	Matkan, ..	Adam and Raheem, ..	200 "	..
Ditto,	Jola, ..	Karam and Najeem, ..	200 "	..
Ditto,	Dheree, ..	Benares Setah and Azoom, ..	400 "	..
Ditto,	Barangola,	Kudrat, Myan, and Myan and Nasurulla, ..	300 "	..

Name of Clan, (Tuppay.)	Name of Village.	Name of Chief, (Malik.)	Number of match-lock men.	Amount of annual tribute paid to the Sikhs.
Ranazai, ..	Barangola, ..	Sayad Myan, ..	100 foot.	..
Ditto, ..	Badawan, ..	Khairoo and Nasam, ..	200 "	..
Ditto, ..	Khari, ..	Zaidulla, Mayat, Mohum and Ataee, ..	600 "	..
Ditto, ..	Ditto, ..	Nai killee, Shah Noor, ..	100 "	..
Ditto, ..	Bhat khel, ..	Baidulla, Uurz, and Raheem, ..	400 "	..
Ditto, ..	Aladaud, ..	Jawaz, Omer and Raheem, ..	500 "	..
Ditto, ..	Shahkot, ..	Rustam and Bahadur, ..	200 "	..
Ditto, ..	Dargahee, ..	Khairulla, ..	200 "	..
Ditto, ..	Kharkahae, ..	Jaman and Kareem-ulla, ..	100 "	..
Ditto, ..	Garee, ..	Mahomed Shah, ..	200 "	..
		Total horse, ..	0	..
		Total foot, ..	19,890	..
		Total tribute, ..	0	..
VALLEY OF CHAMLA.				
Mahomed khel, ..	Amahela, ..	Mahomed, Abdulla and Baghee, ..	200 foot.	..
Ditto, ..	Nakaree, ..	Sangdar, Bazdar and Muhhoob, ..	250 "	..
Mahomedzais, ..	Sorag, ..	Kaim and Kazim, ..	200 "	..
Ditto, ..	Nawayar, ..	Zaidulla, Norr and Mouzam, ..	200 "	..
Ditto, ..	Kolee, ..	Nawaz and Ibrahim, ..	150 "	..
Ditto, ..	Kot, ..	Bahadur Abdulla, ..	200 "	..
Ditto, ..	Makhadeen, ..	Mahomed and Eesoo, ..	200 "	..
Khudoo khels, ..	Bhoos Dheree, ..	Mahomed and Gadoo, ..	200 "	..
Ditto, ..	Charodee, ..	Ootman, Ahmed and Raheem, ..	200 "	..
		Total horse, ..	0	..
		Total foot, ..	18000	..
		Total tribute, ..	0	..

## VALLEU OF BUNHER.

Name of Clan, (Tuppay.)	Name of Village.	Name of Chief, (Malik.)	Number of match-lock men.	Amount of annual tribute paid to the Sikhs.
Barakazais,	Bayra, ..	Kabeer khan and Ameer Baz,	350 foot.	..
Ditto,	Kolearee, ..	Meer Shikar and Anund,	400 "	..
Ditto,	Matanai, ..	Sakur, Soola, and Maddat,	500 "	..
Ditto,	Banshatta, ..	Karam Shah and Naromo, ..	400 "	..
Ditto,	Kalpanee, ..	Sugrud Meer and Nathoo and Najam,	700 "	..
Moorzais, ..	Gagra, ..	Lashkar, Noor and Naem, ..	200 "	..
Goryan khel,	Agrai, ..	Fakeet, Noor and Naem, ..	600 "	..
Ditto,	Konga, ..	Bahodur and Shabdad, ..	400 "	..
Ditto,	Soomegram, ..	Sher, and Pajah, ..	300 "	..
Ditto,	Kayan, ..	Shahar, and Hassan, ..	250 "	..
Esezais,	Torsak, ..	Husan, Husanai, Nujoo and Deleb,	800 "	..
Ditto,	Anyapoor, ..	Mukarab and Mahomed, ..	500 "	..
Ditto,	Itai, ..	Mahomed Shah, Soobeh, and Karam Dad,	500 "	..
Khel Imszais,	Sulbandee, ..	Kale, Arab, Juhangeer dad, ..	700 "	..
Ditto,	Amanapoor, ..	Ibrahim and Meera, ..	500 "	..
Ditto,	Dayram Japaees,	Sarwar and Sahamat, ..	500 "	..
Ditto,	Dheree, ..	Sahamdar, Kaheer and Jahangeer, ..	400 "	..
Ditto,	Kata kot,	Mahomed and Azeez, ..	300 "	..
Ditto,	Bhoos Dhera, ..	Meer Baz, ..	200 "	..
Ditto,	Takhta Baud, ..	Saydad, Myan Syados and Kutub Shah, ..	"	..
		Total horse,	0	..
		Total foot,	8450	"
		Total tribute,	0	..
		Grand Total,	Horse 420	..
			Foot 50,947	Rs. 42,200



*Report of a Trial for Rebellion, held at Moulmein by the Commissioner of Tenasserim. Communicated by the Sudder Dewanny Adawlut. With a plate.*

# GOVERNMENT

*versus.*

NAG PAYN AND 20 OTHERS.

*Charge—Rebellion attended with Murder.*

This trial came on before the commissioner of the Tenasserim Provinces at the sessions for the month of February 1844.

The prisoners pleaded not guilty to the following charge :

1. Nga Pyan, . . . . . Prisoner.

## CHARGE.

1st. In having, during the month of May 1843, unlawfully assembled men for purposes treasonable to the state, and subversive of the public tranquillity.

2ndly. In having, on the 15th of the same month, unlawfully resisted with arms the officers of the Government, thereby causing bloodshed.

3rdly. In having been concerned as accessory in the wilful murder of Nga Kaloo, on the 15th May 1843.

## PRISONERS.

- |                      |                    |
|----------------------|--------------------|
| 1. Nga Shoay Loo,    | 11. Nga Shoay Koo, |
| 2. Nga Shoay Mounge, | 12. Nga Wey,       |
| 3. Nga Dot,          | 13. Nga Oung Meng, |
| 4. Nga Shoay Pho,    | 14. Nga Dok,       |
| 5. Nga Yee,          | 15. Nga Mhwe,      |
| 6. Nga Pathee,       | 16. Nga Shoay Too, |
| 7. Nga Daray,        | 17. Nga Shoay Go,  |
| 8. Nga Pok,          | 28. Nga Kyee,      |
| 9. Nga Han,          | 19. Nga KyauGoung, |
| 10. Nga Nyaik,       | 20. Nga Mhe.       |

## CHARGE.

1st. For having, during May 1843, unlawfully joined Nga Pyan for purposes treasonable to the state, and subversive of the public tranquillity.

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Case of NGA  
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others.

In a trial for rebellion in the Tenasserim Provinces, in which one life was lost, the Court, at the recommendation of the commissioner, who although he had recorded a sentence of death against him, proposed a mitigation of the punishment, sentenced the ringleader to imprisonment for life in the local jail, as a better warning to others than imprisonment with transportation beyond seas; and the remaining prisoners to periods of imprisonment with labor and irons, varying according to their several degrees of guilt.

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Case of NGA  
PYAN and 20  
others.

2ndly. In having, on the 15th of the same month, unlawfully resisted with arms the officers of Government, thereby causing bloodshed.

3rdly. For having been concerned as accessaries in the wilful murder of Nga Kaloo on the 15th of May 1843.

The origin and scene of the disturbances for which the prisoners were tried, were thus described in the letter of reference accompanying the proceedings.

“The insurrectionary movement which gave rise to the trial, was discovered in May 1843, very suddenly, and just at the moment of the intended outbreak. At first, every person denied knowledge of the affair; but enquiry soon showed that it was well known to the Buddhist population of every rank, and that the leader, Nga Pyan, had long been becoming famous for sanctity, which, in these countries, is a necessary introduction to political power, for there is no priesthood in our sense of the word. Those whom we call priests are monks bound by temporary vows, seeking knowledge or their own individual subsistence. The civil magistrate is the real priest, being at the head of the nation taken as a religious as well as a civil community;—thence every Buddhist dynasty has been founded by religious fanatics, or impostors, having military talent,—and the reigning families always claim special powers from heaven. Religious ascetics and fanatics are therefore jealously watched, and put down with a strong hand when their followers become numerous, especially at the periods marked in their prophecies, or, in popular belief, as those in which great changes may be looked for. Such a period is the present, as will be seen from the proceedings.

“The time chosen was judicious—he was to meet his followers from all parts of the country at Gyne, two days’ journey from this, thence he was to come down to the White Pagoda, close to Maulmein, and declare against the English. This was to happen at the begin-

ning of the rains when the country becomes impassable for troops, and he would have been master of the upper country during the rains—which would have produced a great effect on the people both here and in the Burmese territory, where also the people were much excited.

“Captain McLeod, my principal assistant, was despatched at once with a party of the local corps to Daulong, near the Siamese frontier, where Nga Pyan was; and the civil charge (revenue excepted) of that part of the country was also temporarily given him; at the same time the local native officers of districts and villages were called on to arm a portion of the inhabitants, there being reason to suspect most of them of being implicated. The suspicions were made known, with a promise of no further enquiry in case of zeal.

“Forced marches brought Captain McLeod up just in time to meet Nga Pyan as he was leaving the Pagoda, where he had performed the ascetic devotions required, according to popular belief, in founders of dynasties. He was proceeding to Gyne, where the people were at that moment assembling from all parts with arms. The trial details the proceedings—a party under the native magistrate of the district (Moung Gyaing, the Goung Gy-ouk) ordered Nga Pyan and his people, who were in canoes, to stop and give themselves up, but they refused, and a skirmish followed, in which a few of Nga Pyan’s people were killed or wounded, and one man of the Government party was slain. Nga Pyan fled, but by great energy and zeal, and conciliation on the part of Captain McLeod, the Karens, who inhabit those districts and had all joined Nga Pyan, were led to confide in a promise of perfect amnesty if they prevented the flight of the insurgent party—very large rewards were at the same time offered, as far as rupees 1000, for Nga Pyan himself, and eventually nearly all the leaders were secured. At the same time the native servants of Government were assured of forgiveness.

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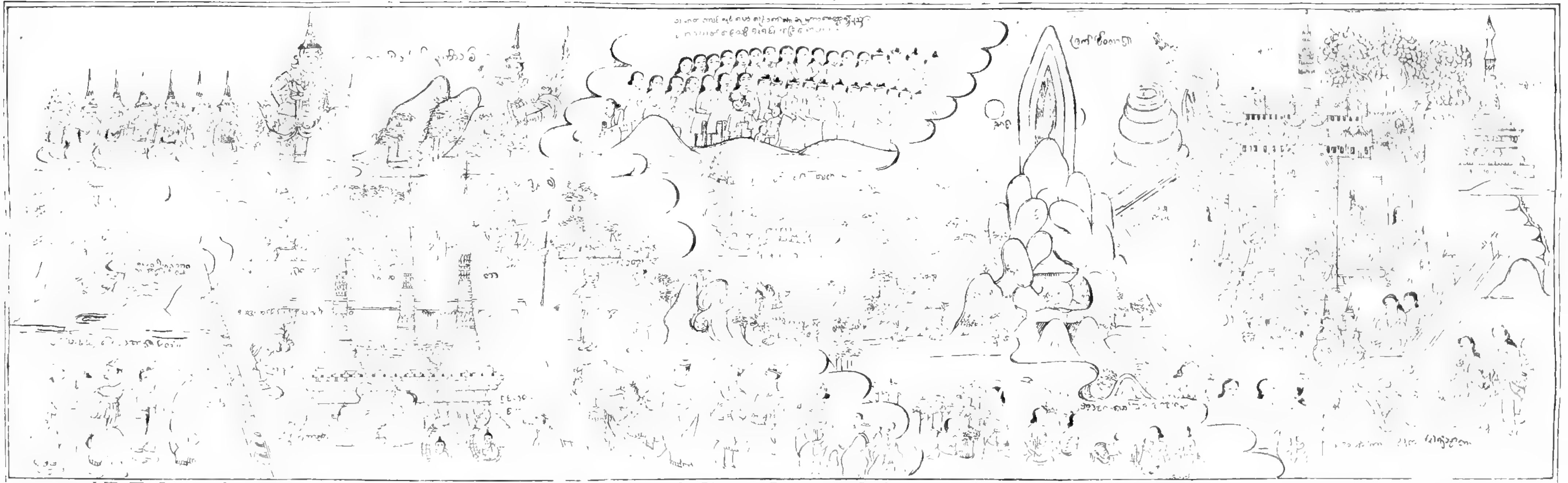
Case of NGA  
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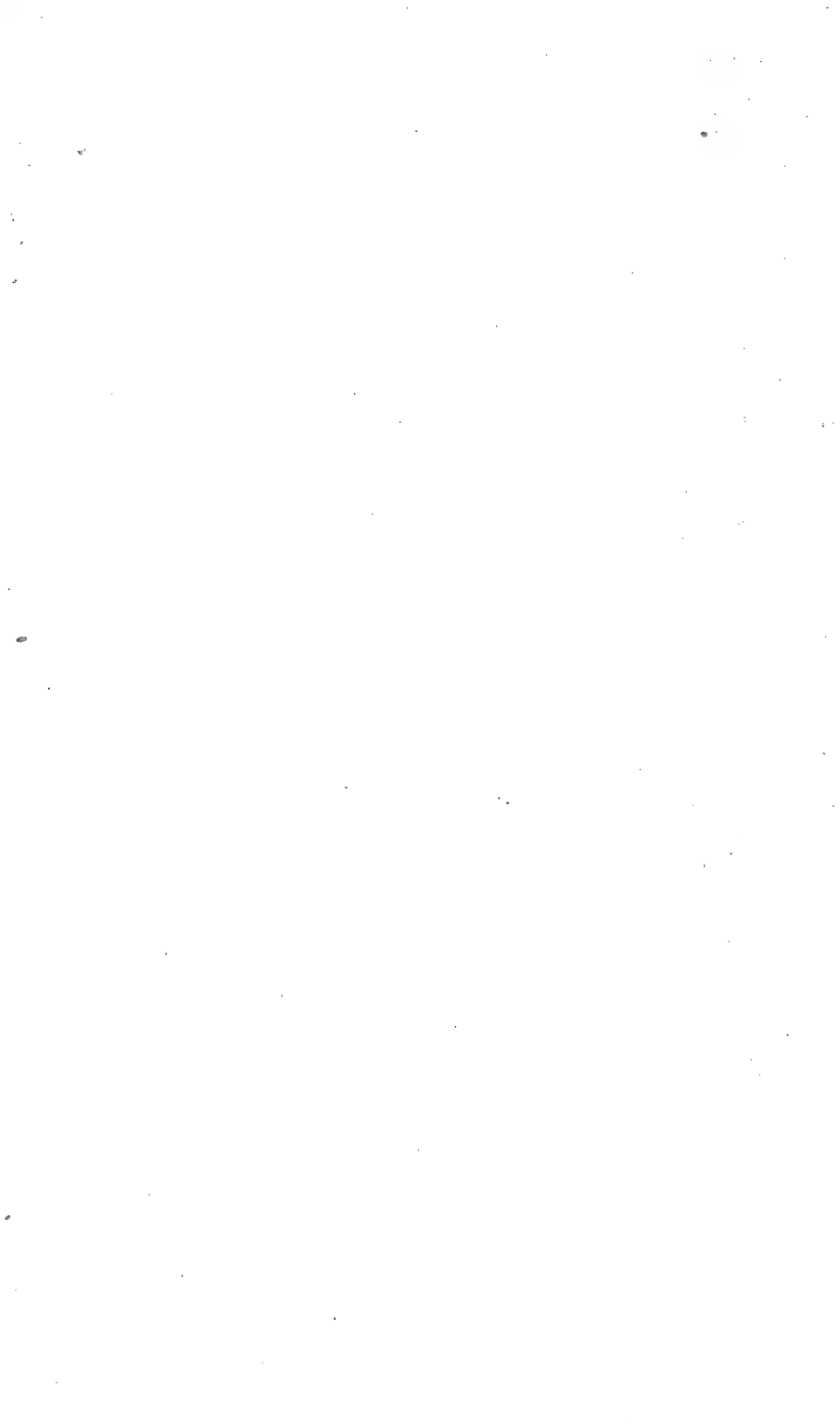
Case of NGA  
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others.

“In pursuance of these promises the inquiries, at least those judicially made, have been limited to what sufficed for the conviction of the prisoners. It will be seen that Nga Pyan first gained influence by works of religious merit; that he raised funds enough to build a number of Pagodas, and that during the prevalence of the cholera, people flocked to him for safety, trusting to his miraculous powers. Over the place where he sat at the White Pagoda, was hung one of the Burmese religious paintings setting forth his religious visions, and the superior beings indicating to him the site and the form of the Pagodas he was to build. This painting accompanies the proceedings, (*See Plate.*) The Pagodas are actually similar to those represented, save the gilding, which is not completed; but a great number of others, of smaller size, were built or begun all around them, by subscription of persons who had become Nga Pyan’s disciples. It is the custom to fill the centre of them with images of Godama, bearing the name of the donor, and it was the names on these which enabled me first to obtain a good clue to the affair—a few of these, out of many hundreds, are also forwarded.

“The proceedings show how all this was directed beyond mere superstition. The people were by the reading and expounding of prophecies, led to look for the revival of a national dynasty of this country (Pegu) in the Burmese year 1206, the present year—and the future ruler was to be the person who should put the *zee*, or umbrella-shaped ornament on the new Pagodas—for the ordinary magistrate was not to do this. On the time approaching, it will be seen, Nga Pyan retired to Daloung with a few of his own devoted followers, to practise the austerities usual in such cases,—he seized the traders moving through the country, and made them swear allegiance, and before proceeding to the rendezvous at Gyne, learning that a part of the local corps was despatched against him, he issued the proclamations



Painted banner suspended over the car of Ngao Nyan a Buddhist priest Chief of the rebellion in Siam Province May 1818 See original in the Asiatic Society Museum, 10 feet 2 inches long by 3 feet wide.



given in the proceedings, calling on them to give up their arms and join him. These proclamations\* are in the form used only by the King of Ava, and never by a subject. He also assumed in all respects the titles of royalty, and set up the black flag which in these coun-

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\* TRANSLATION No. 1.

If your soldiers, knowing that (this) victory-flag-order has been placed, Friday, the 13th of the waxing of Kah-zong, 1206 (a) (May 11th 1843,) still presume to make forcible entrance, I, the golden personage, am possessed of the golden tsah-kyah bow, the gift of the celestial king, and I am possessed also of the tsah-kyah sword.

According to the ancient custom of dynasty-founders, sovereigns only ought to engage in combat. You (the inferior pronoun, equivalent to *you fellows*) and I (the superior pronoun, equivalent to *Lord I*) are not on a par, in point of glory and destiny. If I bind my golden tsah-kyah bow, I fear that death and destruction will come upon (many) creatures, and therefore I place (this) victory-flag-order.

A royal order from the sovereign lord of *Da-mu-tsah-kyah*.

TRANSLATION No. 2.

The sovereign of the four grand continents, the most glorious lord of the tsad-dan, white elephant, master of the aring-da-mah tsah-kyah spear, owner of the ma-nan-ma-yah gem, radiant in benevolence and power, (as) effulgence bursting from the summit of Myenmo,—power to reign over the four continents—issues a royal order:

Ho! all ye soldiers, who come marching from afar unto the victory flag, which I have set, Friday, the 13th of the waxing of Kah-zong, 1206, (May 11th 1843)! That I may easily ascertain, whether you will deliver up your lives, and become my own servants or not; ye are to come by ones and twos, and lay down your arms and do me homage.

A royal order from Lord *Da-mu-tsah-kyah*. (b)

When the oath was administered by Nga Pyan, the royal words were thus recited:—The most excellent master of land and sea, lord of the tsah-dan, white elephant, master of the tsah-kyah weapon, *Da-nu-ra-jah-men* (king *Da-nu*) declares, that, whereas our subjects, the common people, are now in a poor and suffering state; the towns and villages shall, under my reign, be so taken care of, that they (the common people) shall be quiet and happy. Which being read, the oath was administered.

Testimony given before the magistrate.

Moung Tan-Laye.

(A true translation,)

(Signed) A. JUDSON.

(a) Evidently anachronistic.

(b) *Da-mu* is Pali, and signifies *bow*. In the first order, he is styled Lord of the tsah-kyah bow—and in the second, Lord tsah-kyah bow.

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tries is understood to indicate a resolution to subvert the Government *de facto*. It is as proverbial in this sense here as to indicate pirates among European nations.

The prisoner No. 10, Nga Han, being sick was not tried; and No. 11, Nga Nyaik was acquitted. The prisoners No. 8, Nga Dairay, and No. 15, Nga Dok, were convicted on the 1st count, and acquitted on the 2d, and sentenced by the commissioner, Major Broadfoot, to be imprisoned for seven years from the 1st June 1844; no mention was made of the 3d count. The commissioner convicted all the other prisoners, and recorded against them a sentence of death; but, in his letter of reference, he recommended the following remissions of the extreme penalty of the law.

To the prisoner No. 1, Nga Pyan, as the ringleader, he said he had held out no hope of any commutation of the sentence. Had no life been lost, he should have recommended that even this person should be sentenced merely to imprisonment for life; but, as arms were resorted to, he refrained from recommending any mitigation, leaving the matter entirely in the hands of the Court. In the 17th\* paragraph of his letter however, he evidently leaned to the opinion, that justice would be satisfied, and that policy required a commutation of a sentence of death to one of imprisonment for life.

The prisoners Nga Shoay Loo, No. 2, and Nga Shoay Koo, No. 12, as influential and dangerous persons, not

\* 17th Para—"I beg further to recommend that the sentences date from the 1st of July 1843, by which time all were apprehended—and finally I subjoin the reasons referred to above for having, in a case of offence so serious, and so nearly producing very calamitous results, recommended punishment so lenient.

"1st.—The superstitious and national feelings of the people were strongly appealed to; and leniency lessens the chance of the criminals being looked on as martyrs; indeed, in this case, will destroy it. I believe if Nga Pyan be imprisoned for life, and the others punished as above recommended, the general feeling will be that mercy has been extreme, which is always the safer where the Government is concerned.



instigated by superstition as the others, but by the desire of exciting a disturbance, with a view to profit by it; and as having been in Nga Pyan's confidence, he proposed to sentence to imprisonment with labor for 14 years.

The next in activity, No. 3, Nga Shoay MOUNG, No. 16, Nga Mhwe, No. 18, Nga Shoay Go, and No. 19, Nga Kyee, he proposed should be sentenced to imprisonment for 10 years with labor,—unless the Court should think the fact of Nos. 18 and 19 being brothers of Nga Pyan, and men above the average incapacity and resolution, required a longer period of imprisonment.

The rest (with the exception of Nos. 13 and 21, whom he proposed to imprison for two years each,) he recommended should be imprisoned for five years with labor, viz. Nos. 4, 5, 6, 7, 9, 14, 17 and 20.

Why the commissioner sentenced Nos. 8 and 15, who were convicted on only the 1st count, to seven years, while he proposed to sentence those mentioned above to five and two years, was not apparent.

The case in the Nizamut Adawlut was laid before Mr. Reid, who, under all the circumstances of the case, concurred with the commissioner in convicting the prisoners as above recorded. For the reasons stated in the 17th paragraph of the commissioner's letter, he did not think it would be expedient to sentence the prisoner Nga Pyan to suffer death, and accordingly sentenced him to be imprisoned for life. Transportation beyond seas was not added, because imprisonment among those whom he attempted to seduce from their allegiance was deemed a more proper punishment. The prisoners Nga Shoay Loo, No. 2, and Nga Shoay Koo, No. 12, were sentenced to imprisonment with labor in irons for fourteen (14) years; Nga Shoay MOUNG, No. 3, Nga Mhwe, No. 16, Nga Shoay Go, No. 18, and Nga Kyee, No. 19, to imprisonment with labor in irons for ten (10) years; and the prisoners Nga Dot, No. 4, Nga Shoay Pho, No. 5,

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others.

Nga Yee, No. 6, Nga Pathee, No. 7, Nga Pok, No. 9, Nga Oung Meng, No. 14, Nga Shoay Too, No. 17, and Nag Kyan Goung, No. 20, to the same for five (5) years. The sentence of seven (7) years' imprisonment passed by the commissioner on Nga Daray, No. 8, and Nga Dok, No. 15, was annulled, and they were sentenced each to be imprisoned, with labor in irons, for five (5) years. Nga Wey, No. 13, and Nga Mhe, No. 21, were sentenced to be imprisoned, with labor in irons, for two (2) years. The sentences of temporary imprisonment were ordered to commence, as recommended by the commissioner, from the 1st July 1843.

In regard to the prisoner Nga Han, No. 10, whose trial was not completed in consequence of his sickness, the commissioner was directed to use his discretion, and either conclude the trial against him, or hold him to bail for his future good conduct.

NOTE.—The banner represented in the accompanying lithograph has been copied with care from the original, deposited by the sanction of the Sudder Judges in the Society's Museum.—EDS.

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*Memorandum on the Iron Works of Beerbhoom. By, WELBY JACKSON, Esq., C. S. forwarded with specimens for the Museum of Economic Geology.*

SIR,—I send with this letter several specimens of the iron ore of Zillah Beerbhoom ; which it may perhaps be worth while to examine, in order to ascertain its value, and the nature and proportion of its ingredients.

This ore is now worked in the vicinity of Seory in Beerbhoom ; but the manner of working and smelting it is so rude, that I have little doubt much of the iron is left in the refuse ; if railways are established, the demand for the iron of Beerbhoom may be greatly in-

creased, more particularly as the ore is found at no very great distance from two of the most probable lines of railway, those between Calcutta and Rajmahal, and between Calcutta and Benares or Mirzapore.

The soil of the whole of the vicinity of Seory consists of ironstone, but the work is chiefly carried on at Deocha, which is marked in Rennell; also at Bharcata, Damra and Goonpore; it is found in these places, and is also brought from Sibperbaree, and other places in the Pergunnah Mullarpore; all to the north, a little east of Seory, the Sudder Station of Zillah Beerbhoom.

The ore is I believe argillaceous iron ore;\* no flux is used in smelting it, which is done entirely with wood charcoal; a manner of working which may have a good effect on the produce, which is said to be of good quality; but it must be very expensive, and the progress of the work is gradually destroying the fuel in the vicinity; it is smelted twice in circular kilns, the ore being taken out in a mass from the bottom. I send specimens of the iron after the first, and after the second smelting, also of the refuse of each burning; each smelting occupies four days and nights; and I am informed, produces 25 mds. of iron, at a cost of 17 rupees from each kiln; there are about 30 kilns, each of which pays one rupee for each smelting to the farmer of the Loha Muhal, who claims a monopoly of the iron manufacture; the iron thus produced, is sold for 1 rupee a maund to the refiners, who again pay six pie per maund to the monopolist. I understand the iron produced is of very good quality.

It is common, I believe, to find limestone and coal in the vicinity of iron ore of this description: no limestone has yet been found in Zillah Beerbhoom, but the country has not been well examined; coal is found in abundance near the river Dumoodar, about seventy miles off; the want of limestone, the usual flux, is a serious difficulty, and it would be worth while to examine the country to the north of Seory, as far as the foot of the range of hills which runs out from the Ganges at Rajmahal towards Deogurh, perhaps coal might be found

\* It is rather an argillaceous iron-ore matrix, with brown hæmatite and small, semi-crystallised nodules of magnetic iron-ore; called, according to the labels, *Beej pathur* (seed stones,) and from these last the iron is said to be made; but the mixture of the hæmatite and the magnetic ore would give very fine iron.—CUR. MUS. ECON. GEOLOGY.

nearer the place where the works are now carried on ; the only lime procurable is made from the common kunkur.

The circumstance of a monopoly of the iron manufacture existing in Zillah Beerbhoom is curious ; I spoke to the agent of the monopolist on the subject ; it seems he claims and exercises the monopoly throughout what was formerly the Zemindaree of the Rajah of Beerbhoom, which is by far the greater portion of the whole Zillah ; the Rajah no longer holds the Zemindaree, which has been divided and sold ; the monopoly is said to have been purchased at a revenue sale, and to have been acknowledged by a decision of the Sudder Court. I was enquiring more carefully into this subject, but was obliged suddenly to leave the district ; I am much inclined to doubt the right claimed, but have not yet seen the documents on which it is grounded. I cannot conceive how such a right can have originated.

WELBY JACKSON.

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*Account of certain Agate Splinters found in the clay stratum bordering the river Narbudda, with specimens accompanying. By Capt. J. ABBOTT, late Assistant in Nimaour.*

MY DEAR SIR.—May I claim the favor of your attention to a singular phenomenon exhibited by the clay and kunkur strata, bordering the river Narbudda.

2 The valley of this river in Nimaour is a basin of black trap rock, perforated occasionally by peaks of granite. Upon the trap, is usually found a bed of clay twenty feet in depth, rendered barren by an admixture of sand and lime. Upon this bed is imposed black or an iron-brown soil, from half a foot to three feet in depth, composed almost exclusively of the debris of decayed, and the charcoal of burnt vegetation. Masses of trap (occasionally basaltic) break through these strata, and large hollow nodules of quartz filled with white or with amethystine crystals are found scattered over the surface ; but more commonly in those portions of the valley which owing to superior height or other peculiarities, have no covering of clay nor of vegetable soil.

3. Along the Narbudda's brink, the black soil has been generally abraded by the torrents, leaving barren ravines of clay and kunkur,

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the section of which is yearly exposed as the surface crumbles. The kunkur in this bed is scattered through the thickness of the soil, with little visible stratification ; existing there in small drops of the size of pocket-pistol bullets, which being found collected in the rocky beds of torrents, are used as gravel for garden walks.

4. As the cliffs of clay aforesaid crumble away, fragments of agate, milk-white, pellucid or streaked, are brought to light, sown equally through their substance ; not as complete pebbles occasionally fractured or chipped, but universally as fragments, such as might be shivered from pebbles placed between an anvil and a sledge-hammer ; about half of the specimens which I happen to have preserved, accompany this letter. They are faithful samples of the general appearance of this mineral in the clay stratum. It will be observed that the surface is always uncorroded, so that they must have been shivered in their present position as parts of a clay-bed twenty feet in depth ; or more probably, immediately previous to their present location : for, all agates acquire a milky crust by long exposure to the action of the elements. They are found in abundance at the foot of all the clay cliffs, and may be picked out of the strata on ascending. I have seldom if ever found a complete series of fragments constituting a pebble : whence I would argue, that they were shattered previous to being involved in the clay. They are the only stones,\* occurring in this bed, and I have never found one of them unshattered, although there are abundance such in the river bed close by, and the trap rock is full of perfect agate pebbles.

5. You will observe how violent and decided must have been the concussion, to shiver so hard a stone into splinters so sharp and slender ; an application of force, known in Nature at present only at the foot of water-falls having a shallow basin, or upon any rocky ledge at the base of a volcano. Were the fragments found in such a position, the projection upon their original masses of other rocks, might have sufficed to strike them off ; but the clay matrix in which they are involved, would have preserved agates unshattered beneath the fall of mountains.

\* The river channel contains agates, rolled masses of jasper, porphyry, sandstone and limestone. The soil around has few stones excepting boulders of trap and nodules of white quartz.

6. As we believe the trap to be less ancient than the granite beneath it, so we naturally conclude the clay stratum to be less ancient than the trap upon which it rests, and which otherwise must have submerged it. The agate pebbles seem evidently to belong to the trap formation, in the solid substance of which they prevail in such numbers as occasionally to give it the appearance of pudding stone. The convulsion which shattered the agates under consideration must have happened after the deposit of the trap strata, but I think previous to the deposit of the clay bed, the first soil sprinkled over the rocky surface. Whilst the valley was still a basin of naked trap, the fall or rolling together of rocks might shatter even the solid substance of agate. But this effect could be produced under water, only I think at the foot of water-falls. And, that every agate of a stratum, twenty feet in depth and many miles in area, should have been subjected to this action, seems improbable. The very clay itself belongs not to the formation upon which it rests; but has been wafted hither from mountains probably hundreds of miles distant, and thus mixed up with the agates, by some deluge of a very extensive character. And the appearance of these splinters of agate might lead conjecture to regard the primitive soils of our earth, as ground from the living rock, rather by some brief but most violent convulsion of the elements, than by the gradual and equable action of an ocean, in a succession of ages.

7. With such speculations all Geologists are familiar; yet every fresh illustration seems worthy of attention; and it is perhaps seldom that we have so clear an evidence of the action of secondary forces in an interval so remote as that separating the formation of the trap layers from the era of the clay deposit.

J. ABBOTT.

4, *Ballard's Buildings*, 1st Sept. 1845.

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*Notes, chiefly Geological, across Southern India from Pondicherry, Lat. N. 11° 56', to Beypoor, in Lat. N. 11° 12', through the great Gap of Palphautcherry. By CAPTAIN NEWBOLD, F.R.S., M.N.I., Assistant Commissioner, Kurnool. No. III., with a plate.*

At Pondicherry, the soil on the surface is sandy; but the subsoil consists of a blackish stiff clay imbedding existing pelagic shells. A well lately dug near the factory of M. Buirette, exhibits the layers according to the diagram below.

Immediately to the west of the city the land gently rises into the low eminences called the Red Hills, which are intersected by numerous small ravines; and rugged with inequalities of surface.

In the valley and rising ground between them and the village of Trivictory, about sixteen miles westerly from Pondicherry, are the Neocomian beds of limestone, and near Trivictory itself, the celebrated fossil wood deposit which has been described elsewhere. The principal shell limestone localities are in the vicinity of the villages of Sydapett, Carassoo, Coolypett and Vurdavoor.

*Trivictory.*—At Trivictory the granite and hornblende schist are again seen, and also at Belpoor, or Vellapur, the kusbah of a taluk of this name in South Arcot, twenty-four miles westerly from Pondicherry. These rocks are penetrated by trap; and on them rest in little disturbed stratification, the Neocomian limestone beds, which support, like the nummulitic limestone of Egypt, beds of loose sandstone entombing the large silicified trunks of both dicotyledonous and monocotyledonous trees, the former being by far the most abundant both in the Egyptian Desert, and likewise at Trivictory. In both cases no beds of soil in which the trees formerly grew, no Dirt bed, as in the Portland fossil forest, in which the roots and stems stand erect as they grow, could be traced; nothing but the bare calcareous beds of the ancient cretaceous and nummuliferous oceans in which they were severally deposited.

*Belpoor.*—The face of the country between Trivictory and Belpoor is rough, with ravines and water courses; with surface blocks and bosses of granite and hornblende schists. These rocks are covered in one or two localities by patches of laterite, and support a sandy soil; which, in the vicinity of Belpoor, assumes the character of a tolerably fertile loam, producing *Indigo, Rice, Tobacco, Raggi, Bajra, Culti, &c.*

A bed of red clay, coarse sand, or the gravelly detritus of the subjacent rock, often form a subsoil of considerable thickness. Water is found at depths of from twelve to fourteen feet, and of excellent quality; efflorescences either of common salt, or carbonate of soda on the surface soils are rare.

The town appears populous and thriving, and contains about 500 houses, inhabited principally by cloth merchants, and cultivators (Kongyes). Near it lie the ruins of an old Jain temple. Two of its mutilated images stand at the Traveller's bungalow gateway, with their faces turned towards the pillars.

Large equestrian statues of *Ayanar*, constructed of brick and chunam, are scattered about this and other portions of the ancient Hindoo kingdom of Dravida, in the country of the Tamuls. I do not recollect seeing these statues in my travels through the ancient regions of *Andhra*, *Karnata*, or *Maharashtra*, whose boundaries are even to the present day marked by their vernacular languages, viz. Telinghi, Canarese and Mahratta.

These statues are not frequently colossal, and generally stand in the open air near pagodas or in sacred groves.

*Wulundoorpet*.—This village lies about twenty-nine and a half miles SW. from Belpoor. The aspect of the surrounding country is almost unbroken by elevations, covered with a sandy soil, and angular quartz gravel, through which the subjacent rock, viz. hornblende schist, and gneiss, occasionally jut out in almost vertical laminae, with a general direction towards the SW., and the dip towards the SE. The gneiss is often curiously contorted, and passes by weathering into a loose micaceous grit, which being washed away, leaves gaps in the continuation of its bed. The gneiss alternates with the hornblende schists, which often appears in thin layers conforming to the general direction and dip of the strata.

These rocks are penetrated by veins of a porphyritic granite, consisting principally, like that at Permacoil, of reddish felspar, with adularia, and but little mica. The last mineral and hornblende in foliated crystals are seen aggregated in nests in the gneiss with pyrites; and chlorite appears as a dull green earth in cavities; sometimes these minerals are entirely wanting. The conditions under which they as well as other minerals are subject to this state of segregation, and

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again of equable diffusion throughout the entire mass of rock, are matter of interesting enquiry. It is a well known fact, that heat under fusion will contribute to the concentration of particles of copper ore diffused through a matrix, and it seems probable these effects in the hypogene rocks have been produced during their subjection to metamorphic heat and crystallization.

Foliated garnet and reddish felspar occur in the more quartzzy parts of the gneiss.

In the steps of a large well in front of the Traveller's bungalow, are a few blocks of a gritty sandstone, resembling the more consolidated portions of the loose sandstone imbedding silicified wood at Trivicary. It was marked with brick red, and ochre yellow, having bands. It is said to have been quarried about two miles off, and also to occur near Verdachelum. This led me to infer the possibility of the extension of the fossiliferous beds of Pondicherry in this direction, an inference subsequently verified by Mr. Kaye, of the Madras civil service, (Vide Madras Journal for June 1844.)

The limestone in which the Verdachelum fossils are imbedded, resembles more that of the Trichinopoly beds, and the pelagic shells it contains are supposed to be of a rather more recent epoch than the Neocomien, or lower cretaceous series of Pondicherry, but this is a point not yet quite settled by the present talented Secretary of the Geological Society, Professor Forbes. The limestone was found to be associated with beds of an overlying sandstone, imbedding silicified wood, precisely resembling that of Trivicary and Pondicherry. These beds, I have little doubt were once continuous.

It is a point of much importance to ascertain the fact of the limestone beds being continuous or not, or whether the Pondicherry beds occupy a lower place in the order of superposition than those of Verdachelum and Trichinopoly. The Verdachelum beds lie between Paroor, a village about seven miles WNW. from Verdachelum and the town of Verdachelum itself, which lies about twelve miles S. by E. from Wallundoorpett. If the account given me by the natives be true, the sandstone beds extend to within two miles of Wallundoorpett. The boiling point of water gives the plain at Wallundoorpett but little elevation, if any, above the surface of the sea.

A lunar halo occurred here, the radius of which I found to measure  $21^{\circ} 30'$ , sky hazy, slight sensible depression of the thermometer  $2^{\circ}$ .

The superstratum of soil is sandy, frequently entirely composed of sand, some of which has doubtless been washed from, or forms part of the sandstone and silicified wood beds. In other parts a rich greyish clayey loam, mixed with a portion of lime, occurs, yielding fine crops. Staple articles of cultivation are similar to those of the last village. Kunker is occasionally met with in surface nodules, and as a substratum. The water is sometimes brackish here.

Wallundoorpett was once a place of some note under a Poligar, but now dwindled into insignificance. A sulphuriferous earth is said by natives to exist in the Wodiapolium jungle near Womaloor, a few miles south of this, occurring in the bed of a swamp, about half a mile in extent. Specimens were sent me by Mr. Fischer of Salem. The soil is of a greyish colour, friable, and the sulphur occurs in small crystals and impure nodules distributed through the soil.

*Chinna Salem.*—The country between this and Wallundoorpett is an undulating plain. On approaching Chinna Salem, which is about twenty-six and a half miles W. from Wallundoorpett, and fifty-five miles direct distance from the coast at Cuddalore, a chain of lofty hills with undulating ridge, broken in one or two places, is seen to the NNE. coming down from the N. apparently about ten or twelve miles distant, but ending or turning abruptly towards the W. These hills are the southern extremity of the Subghautine chain, called the Jeddy or Javidie, which flanks the eastern side of the Amloor valley.

Régur, or black cotton soil, I first observed covering the plain between Chinna Salem and Wallundoorpett, immediately to the W. of the Traveller's bungalow at Congrypollum, after crossing the rivulet which flows from the Jeddy hills by Verdachelum to the Vellaur or Porto Novo river. It is much mingled with the sandy alluvial local soil, with which it covers the surface in alternate stripes. The shrub which is almost peculiar to Régur, viz. the *Jatropha glandulifera*, is seen in great strength; and also the interlacing fibrous roots of the nutgrass. Crops of cotton now begin to appear. Beds of kunker are seen in ravines and stream banks, and sometimes occurring in higher situations, in the form of small mammillary mounds, which appear to have concreted around the mouths of springs now choked up.

In the plain, hornblende schist is the most prevalent rock. Gneiss, often granitoidal, alternates with it, still penetrated by the porphyritic veins previously described. The layers of gneiss are seen in some

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localities running round spheroidal masses in its substance, which do not partake of the laminal structure, and have just the appearance of knots in layers of wood. These spheroids when broken have the structure and composition of true granitic, and were probably boulders, or fragments of granite, embedded in the gneiss prior to its passing into the metamorphic state, when it was first formed as an aqueous deposit; a few dykes of basaltic greenstone now rear their black crests above the surface.

Chinna Salem is a large village in the South Arcot district, near its boundary on the West by Salem. The inhabitants are mostly engaged in agriculture and the weaving of cotton cloths. It was formerly under a Poligar, whose descendants are still in existence. Some of the wells are brackish.

*Ahtoor.*—The Arcot frontier is crossed into the Salem district, between the villages of Royapanoor and Nuttakara (about six miles westerly from Chinna Salem), to Ahtoor, which is about twenty-one miles distant.

Around Ahtoor gneiss is prevalent, penetrated by granitic veins, and also by dykes of basaltic greenstone; one of which crosses the bed of the river in a SSW. direction. The hornblende of the gneiss is often replaced by the magnetic oxide of iron in thin regular layers, alternating with the felspar and quartz of the gneiss. It also occurs in beautiful octahedral crystals with polarity. The exterior planes of the crystals have often a bright silvery appearance from lamella of mica. Their specific gravity is estimated so high as  $5^{\circ} 13'$  at a temperature of  $60^{\circ}$ . The ore is also found in steel-coloured grains, and nests disseminated in the more quartzey beds of gneiss. This is the rich iron ore employed in the smelting establishment at Porto Novo. First rate Wootz is manufactured from it. It is also used by the native smelters, who informed me that the best sort of ore is got from two hills about one and two koss distant to the SSW. of the village, which they say are full of the ore, and are called Callurchan and Moora-gutta Mullaye. The natives here employ a mixture of black magnetic sand from the Nullah beds with the steel grey magnetic oxide in the manufacture of steel. The native furnaces rarely produce more than from four to six maunds of iron per diem, which sells on the spot for one rupee or less per maund. The steel and iron of Nagrepetta is

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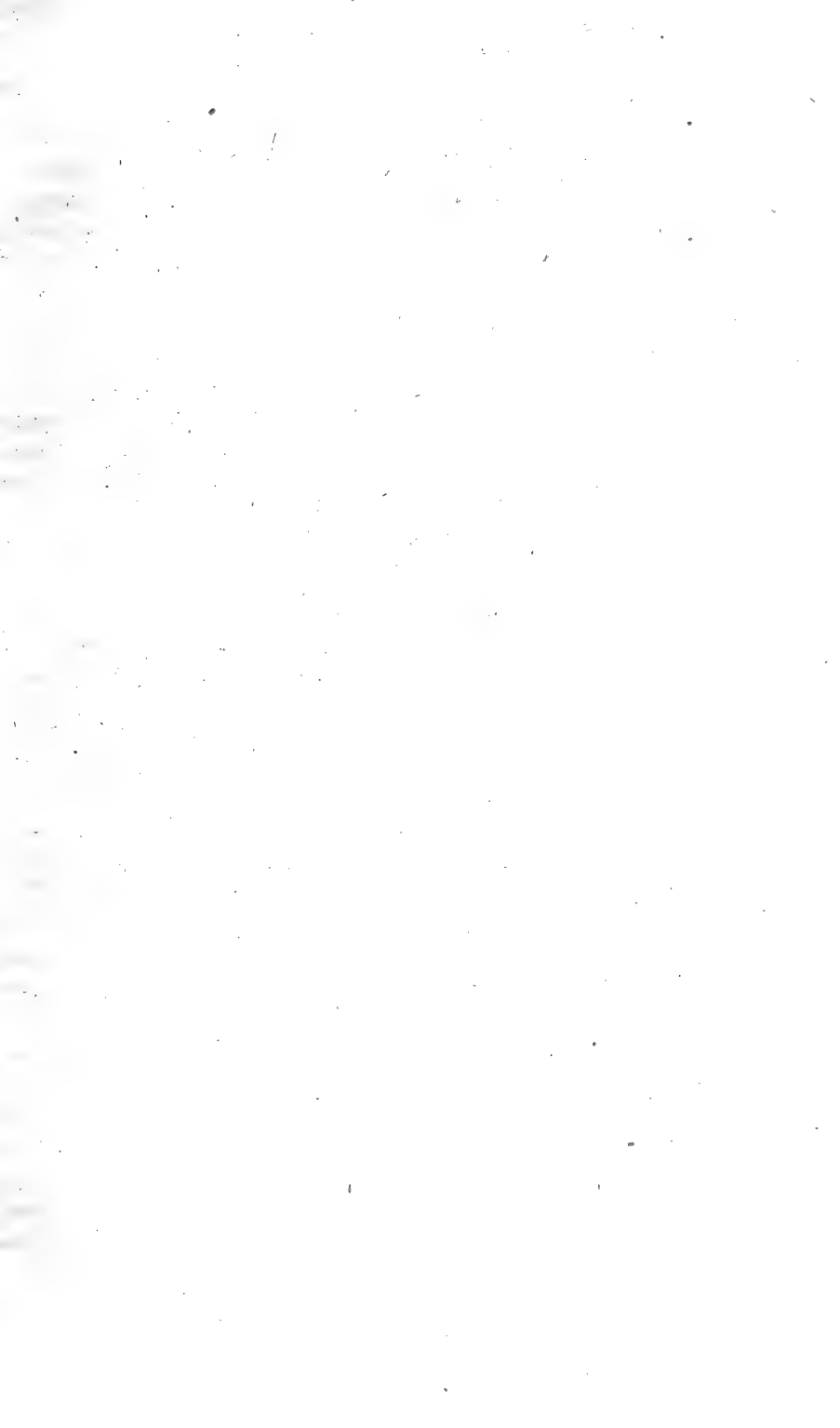
most prized by the natives, but whether this excellence is attributable to a better mode of smelting or better ore, does not appear. According to the natives, about 100 families of the Dhairs at Ahtoor are employed in getting iron ore ; there are about thirty or forty iron furnaces in this vicinity.

Ahtoor lies near the base of the great break of Salem, where the high table lands of Mysore, the Balaghat, &c. descend by an abrupt step to the plains of Salem and Coimbatoor. To the south of this break, a broken *disjointed mass* of bare rocks forms a sort of talus to the lofty steeps on the North ; but separated from them by a narrow and in general flat-bottomed valley, along which the road runs to Salem. The extreme height of the ranges to the right (or N.) by a rough trigonometrical observation from a paced base, I made to be (?) feet above the level of the valley, or foot of the break at Ahtoor. And Ahtoor by the boiling point of water I find to be about (?) feet above the sea : but these observations must only be regarded as some approximation to the truth.

The subjoined diagram\* will give an idea of this profile presented in the bolder parts of this great feature, in the physical configuration of South India. The rocks to the South of this break, after running southerly some miles, attain near Shendanumgalum, not far from their termination to the SW., an elevation little inferior to that of the ranges on the North of the break. The break itself varies from one and a half to three or four miles in width. It contracts East of Ahtoor, and opens out West of it as Salem is neared, and is about fifty-six miles long.

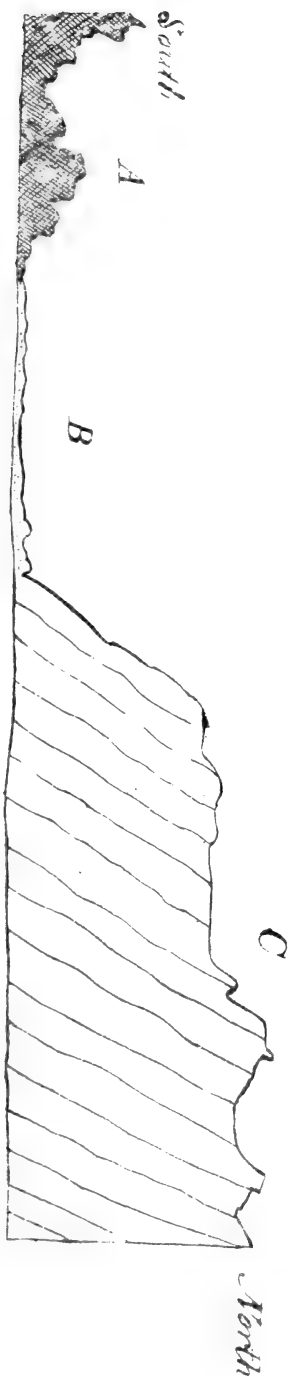
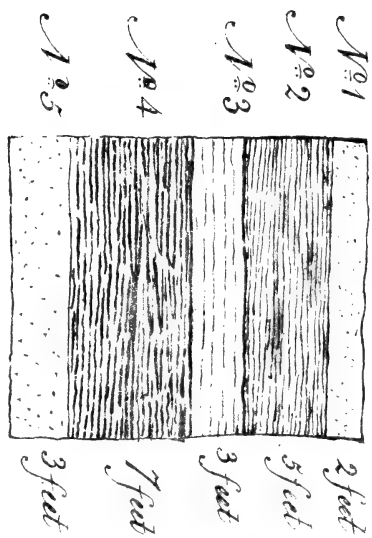
Ahtoor was formerly held by a Poligar, the remains of whose palace, are still to be seen in the fort, a low building supported on Saracenic arches, and covered with a terrace roof. The fort which was, it is said, built about four centuries ago by the then Poligar, Ghut Moodely, stands on the North bank of the river, rectangular in shape, and provided with wet ditch, glacis and covered way, except on the South face, which is washed by the river. The walls are of stone, with a ruinous brick parapet, garnished with mud bastions, and square cavaliers in the usual Hindoo style. It is entered by a gate on its eastern face : and, besides the palace, contains two temples to Siva and Vishnu ; the remains of buildings occupied by the European garrison

\* See plate.



*Diagram to N<sup>o</sup> III  
of Capt Newbold's  
Geological Notes across  
the Peninsula*

*Section of Well 20 feet deep*



which held it after the fall of Seringapatam; granaries, powder magazines, and in the NW. angle, a tomb inscribed to the memory of Lieut. Colonel John Murray, 1st Cavalry, who died 1799, erected by his widow, (6th May) also an obelisk, from which the inscription evidently has been shamefully removed.

Ahtoor is now the *Kusbah*, or capital town, of a Taluk, Lat. N.  $11^{\circ} 40'$  and Long. E.  $78^{\circ} 48'$ . It comprises, the natives say, upwards of 1,200 houses, occupied chiefly by *Kuddiyans*, or cultivators, (exclusive of the Nellalo, Pulli, Agmuddi, Nattaman, Mullayman, Latraman &c.) and Dhairs, chiefly engaged in procuring and smelting iron. There are also nearly fifty families of Brahmins, of whom the Smaltal sect is much the most numerous; next the Maduals, and finally the Sri Vaishnavams. There are about fifty houses of Mussulmans, chiefly employed as peons, in mat-making, day-labour, and a few in agriculture. To hold the plough is almost a *dernier resort* with a Mussulman of South India.

The houses are neater, and more cleanly than any I have seen in this part of India, and are often tiled. Mr. Fischer, who may be truly styled the Salem Zemindar, has a *dépôt* for indigo and cotton here. I saw thirty-six women and children employed in cleaning cotton, which is done by means of wooden cylinders, resembling those of an Indian Sugar-cane mill *on a small* scale, revolving horizontally, and turned by the hand.

The table land on the hills to the North is said to be held free by Poligar Pedda Collaray. It produces hill rice, castor-oil plant, *Kimbgoni*, and a little common rice. The produce of the land about Ahtoor is much the same as at Chinna Salem. The water of the wells is often brackish.

*Salem.*—From Ahtoor to within three miles East of Salem, the Pass continues along the southern base of the elevated table lands of the Balaghat. Near Salem the mountains which support them assume a bolder and more indented outline, rising in separate conical peaks, domes, and abrupt ridges. The highest peak of the Moolnad by rough trigonometrical calculation, is upwards of 3000 feet above Salem, and Salem itself, by the boiling point of water, is about 1,131 feet above the sea.

The same formation prevails around Salem as at Ahtoor. The gneiss is often penetrated by veins of eurite, of a faint reddish and

greenish white; and with red felspar coloured with actynolite and chlorite. Hornblende schist is very prevalent, mica and talcose schists less so.

The foot of the steep descent of the Shevaroy hills is about six miles to the N. by E. from Salem. The granite losing its mica passes often into a pegmatite, and gneiss into leptinite.

Both Regur, alluvial reddish, sandy and clay soils, and *mussub* or regur mixed with alluvia, are found around Salem. The staple productions are cotton, indigo, rice, bagra, and *juari*. The table lands of the Shevaroy hills produce fine coffee, of which extensive plantations have been recently formed.

Heyne tells us that formerly the East India Company had an establishment for the *purchase* of cotton-manufactured goods here, but now English cotton cloths drive the Indian out of the market, and the raw material is exported to England, manufactured into cloth, and under-sells the Indian cloth after having performed two voyages, collectively equal to the circuit of the globe.

The subsoils are *kunker* and *mhurram* (gravelly detritus of rocks in situ) saltpetre, murate and carbonate of soda, occur in the surface soils.

*Salem*.—Salem is capital of a collectorate of the same name, situated Lat. North  $11^{\circ} 41'$  Long. East  $78^{\circ} 14'$  in the plain a few miles to the SW. of the great break in the table land of the Balaghat, which here descends upwards of 3000 feet to the plains of Salem and Coimbatore, by the steeps of the Shevaroy mountains.

The Civil and Judicial head-quarters of the district are fixed here, though the collector generally resides at Ossoor, on the table land. A detachment of Native Infantry, furnished from the garrison of Trichinopoly, of three Companies, supplies the treasure and jail guards, &c. (March 1840.)

The native town lies on the left or eastern bank of the Tirrimani stream, which empties itself into the Cauvery, and separates the town of Salem from the fort, barracks, and residences of the Europeans. It is about sixty paces broad, and crossed by a bridge of five arches. During the dry season, like the other streams of South India, it cannot boast of too much water.

The native town is nearly a mile in length, the main street broad, clean, and in general well drained.



The houses are usually tiled, with verandas in front, supported by wooden pillars, and sheltered from the oblique rays of the sun by awnings of cotton cloth. The market day is held on Tuesday. Beside cloth manufactories, Salem boasts of the best steel manufactory in South India, and the name of Arnachelum, for beautifully tempered heads for hog spears, and *couteaus de chasse* stands unrivalled. The iron and steel come principally from Ahtoor, Tumbumpetty, Shendamungalum, Trimulkerry, and Namgurpett, Indigo is another of its principal exports.

A considerable quantity of salt-fish is imported from the Western Coast.

The population of the town and suburbs cannot be less than 35,000, of which the weavers form the greater proportion.

The fort is of mud and stone, and now a *ruin*. It was built by Chinnaper, and contains a temple to Alighirry Permalvo.

Mr. Fischer holds lands in and around Salem, amounting to about 1,25,000 acres, from the Government, on the yearly payment of 5,000 pagodas. He has an experimental garden here, which is promising, in which I observed tea from Assam, Guinea grass, Otaheite sugar-cane; and among many other rare fruits, the apple and pear, which do not appear to thrive.

The physical aspect of this district is particularly varied and beautiful, extending over the table lands of the Balaghat, and over the plain of the Baramahal, which is said to be 550 feet higher than Salem. Besides the Jiwadie, Shevaroy, and Ahtoor ranges already touched on, and which belong to the line of Ghaut elevation, are the ranges of Shendamungalum and Collymully, on the SE. confines of the district, all inhabited and cultivated. To the South-westward, the country is more open, and descends slightly in a plain to the bed of the Cauvery, which, with the Palaur in the Baramahal, are the principal and almost only drainage lines of any importance, East of Salem the slope is easterly to the sea. In the Baramahal, towards the NE., the area is estimated at 6,520 square miles, of which only about 3-10ths are cultivated, with a population, (exceeding that of Coimbatore) of 9,05,000 souls, or about 112 per square mile, chiefly employed in agriculture and weaving. The annual revenue is about 19½ lacs of rupees.

The roads through the Salem district, made under the judicious directions of Mr. Orr, are the best in the Madras Presidency.

*Chrome and Magnesite Mines.*—From Salem I visited the Chromate of Iron and Magnesite mines, of which an account will be found in the Journal of the Royal Asiatic Society, No. XIII, for May 1842. The former are situate about four miles to the NW. of Salem, in a bed of magnesian rock, analogous to serpentine, and associated with talcose mica, and hornblende schists, and gneiss.

The mineral is found in veins with the magnesite, the mines for which are hard by: but the latter seems to exist in greatest abundance in the hornblende schist, which is highly garnetiferous.

The mining tract is an assemblage of low broken rocks, spreading over an extensive jungly tract, at the West base of the Shevaroy mountains.

*Sankerry-droog.* The rock on which stands this old Droog, is about twenty-four miles SW. from Salem. It is composed of a fine porphyritic granite, which has broken up the gneiss on its flanks, and rises boldly from the plain to a height (approximated by a trigonometrical observation from a paced base) of 930 feet.

The sides are masses of bare rock, often precipitous, between which not unfrequently pushes forth a vigorous vegetation.

The porphyritic granite has invaded the hypogene rocks, and burst through them in innumerable dykes on its SW. flank; the gneiss rests like a mantle, with a general dip of  $75^{\circ}$ . S.  $15'$  W. but the strata are in much disorder and confusion. On the western side, the gneiss is seen interstratified with layers of hornblende, actynolitic schist, and garnet rock, in which is a layer of a fine crystalline limestone, (marble) which from its effervescence with acid, and peculiar appearance and weight, I should think is magnesian. Near its contact with the garnet rock, its substance is starred with innumerable minute garnets, both red and green. Garnets of a light brown colour, resembling cinnamon stone, also occur in this limestone stratum; the limestone is seamed by a dull amber-coloured hornstone, which penetrates the rock in thin seams, and stands out in relief on the surface of the more rapidly weathering limestone, giving it a grooved and corrugated aspect.

The green garnet is found in the largest crystals, in the white quartz veins which intersect the hornblende schist and gneiss. The green

garnet, (if so it is, for I have not yet had opportunity of submitting it to analysis) is in general of the foliated, rhomboidal variety, and with its white quartz matrix form a very beautiful rock. The quartz imbedded also a mineral of a hair-brown colour in hexagonal prisms.

The variegated appearance imparted to the limestone near the line of junction by the admixture in irregular lines of red and green crystals, is curious and interesting.

These beds can be traced on the side of the rock till they disappear under masses of porphyritic granite, which have slidden down from above. In contract with veins of granite the garnet rock acquires a glazed surface, and a disposition to split into prisms when struck with a hammer.

The felspar of the porphyritic granite is usually reddish ; the mica dark green, and the quartz of a light transparent grey. The two latter minerals are occasionally wanting ; the felspar becomes a granular or compact paste, imbedding larger crystals of felspar ; in short, a true porphyry.

The country surrounding the base of this rock, which affords so instructive an example of the effects of Plutonic intrusion among the metamorphic schist, is bold and rocky ; and, towards Salem, the dark low ridges show that hornblende schist is the prevailing rock, intersected by low ridges of white quartz.

Near Sankerry-droog granite and gneiss are more common ; the presence of the first being clearly indicated to the traveller by the bolder aspect of the country.

The gneiss and other hypogene strata are almost every where bent and contorted. The Traveller's bungalow stands on a bare surface of gneiss, presenting a curious example of contortion, and the rock of Sankerry-droog is a finer example of granite veins in gneiss than the far famed Cape Wrath itself, figured by McCulloch and Lyell.

The soil is mixed regur and red alluvial ; saltpetre is manufactured in the vicinity.

The hill fort was once a place of great strength, and originally built by a Beder Poligar, it was subsequently strengthened by Hyder and Tippoo, and within the last twenty years was garrisoned by the Company's troops.

The village of Sankerry-droog now contains nearly 300 houses, chiefly of Telinghi, Bulgawar, Mahomedans, Pullaywars, Yeddyers, cloth-weavers, and a few Brahmins of the Madul, Smartal and Sri-vaishnavam sects; the first predominating. It is worthy of remark that a few Canarese families are to be found here, also a few Telas and Comtis. Saltpetre and silk are manufactured here.

The Thermometer (Faht.) placed on the naked rocks at this place, at 2 P. M. in a clear tranquil day, and fully exposed to the sun's rays, stood at  $120^{\circ}$ , at  $5\frac{1}{2}$  P. M.  $100^{\circ}$ .

About six feet above the rock's surface it indicated  $110^{\circ}$  at 2 P. M., shade  $90^{\circ}$ , and at  $5\frac{1}{2}$  P. M.  $90^{\circ}$ , shade  $82^{\circ}$ .

On the sandy soil at 2 P. M. the mercury rose  $4^{\circ}$  higher than on the rock.

The temperature of a spring was  $82^{\circ}4$ . These observations were made in the middle of March.

*Erode.* From Sankerry-droog to Erode, which lies about  $1\frac{3}{4}$  mile on the right or South bank of the Cauvery, there is a gentle sinking of the face of the country towards the bed of the river; the formation is chiefly gneiss and hornblende schist; strike of strata towards S.  $20^{\circ}$  E. and dip at an angle of  $80^{\circ}$  E.  $20^{\circ}$  N. There are many irregularities and exceptions to this rule.

The mica of the gneiss in the bed of the Cauvery near Erode is dark shining and foliated.

The surface of the rock has been scooped out by the action of the water into longitudinal furrows and troughs, following the line of stratification, which here happens to be parallel to the course of the stream.

An examination of the grooves and troughs is interesting in many points; and especially as demonstrating the difference caused either by the action of water alone, or by gravel and sand hurried along by water over rocky surfaces, in contradiction to the furrows resulting from glacial action.

The latter run on in straight undeviating parallel lines, unaffected by the different degrees of hardness of the rocks, while the depth of the former, and sometimes even their direction, perpetually varies with the varying resistive powers of the rock, and are particularly obvious

whenever quartz or chert veins happen to cross the gneiss in the direction of the stream, when they stand out usually in relief, and but little comparatively worn down.

In the channel of the river I found a coarse sand and gravel consisting of rolled fragments of quartz, syenitic granite, granite porphyry, basaltic greenstone, augite rock, hornblende schist, reddish porphyry, with tourmaline, like that higher up in the bed at Serin-gapatam, chert, jasper and iron ore, (oxides and hydrates). The sand contained magnetic iron sand, garnet, corundum, and a pale sapphire-coloured quartz the latter rarely; evincing the existence of mines of these minerals in the rocks higher up the bed.

The corundum, ruby, and sapphire are all known to exist in the Permutty Taluk lower down, and the beryl at no great distance.

The Cauvery at Erode divides the Salem and Coimbatore Collectories. Erode stands in the latter, and is Kusbah of a Taluk of the same name. Latitude  $11^{\circ} 20'$  N., longitude  $77^{\circ} 48'$  E. Buchanan states that, under Hyder's government, Erode numbered 3000 houses; in Buchanan's time it had scarcely more than 300, having been sacked by General Meadows' army in the war with 'Tippoo. The population has not much increased, it consists of the same castes as at Sankerrydroog, with Brahmins of the three sects.

The cultivation is principally rice, the produce of a tract watered by a canal from the Bhowani river to the North, dug, it is said, by a Vellala, named Kalinga Raya Conda.

The ruins of the extensive mud fort, formerly one of our garrison, now contains nothing but a pagoda, the houses of a few Pujaris (officiating priests), and a depôt for saltpetre manufactured in the vicinity, the property of Mr. Fischer of Salem.

The earth from which it is here obtained is that from the sites of decayed villages. It is reddish in colour, and mingled with old coarsely pulverized brick and mortar, wood ashes, and decayed vegetable and animal matter. The saltpetre is extracted by the usual process of lixiviation and evaporation, and boated down the Cauvery from Moganore during the monsoon months, to Nagore, whence it is shipped by sea to Madras.

The boiling point of water in this part of the Cauvery valley indicated a depression below the plains of Salem of about 250 feet.

*Chennamulla*.—From Erode to Chennamulla a number of rocky undulations are crossed, running parallel with the strike of the strata nearly SSW. The formation is gneiss alternating with mica, and hornblende schist, with layers of actynolitic schist. The dip is generally E.  $15^{\circ}$  S.

The hill of Chennamulla is a mass of stratified quartz sprinkled with garnets and passing into garnet rock. Some of the imbedded garnets are tolerably well crystallized, and of deep rich colour. The prevalent form of crystal is the dodecahedral, the rhombic dodecahedron (Almandine) is not so common. The gneiss is often coated with incrustations of a flesh-coloured kunker: and beds of it form in many places the subsoil. The surface soil is in general reddish and gravelly.

At the foot of the rock I picked up a fine garnet imbedded in a nest of a dark fibrous hornblende.

*Beryl mines of Konghyum*.—From Chennamulla I visited the Beryl mines of Konghyum, of which a description has been already given by me in Jamieson's Philosophical Journal.

I shall now content myself by pointing out, that they lie close to the village of Poddioor in the Konghium Taluk, about forty miles ENE. from the town of Coimbatore, which lies in  $11^{\circ}$  N, and  $77^{\circ} 1'$  E. It occurs in the vicinity of granitic, porphyritic, and pegmatitic veins in the gneiss, associated with fine specimens of rock crystal Cleavelandite, and, though rarely, pyramidal felspar or scapholite. Konghium was the ancient name for the Coimbatore district.

*Avenashy*.—Gneiss, and hornblende schist penetrated by granite and basaltic greenstone, are the rocks next within the plain around Avenashy. Dip of strata, E.  $10^{\circ}$  S. strike N.  $10^{\circ}$  W. Soil and subsoil similar to those of Chennamulla. Saltpetre is here manufactured from a mixture of old village refuse with the rich vegetable soil dug from the bottom of a tank. Patches of the ordinary soil are seen moist with impregnations of soda. The staple articles of produce are *juari*, *raggi*, and *bajra*. Cotton is grown at a little distance in the *regur* plains. Cotton cloths are here manufactured.

The village is pleasantly situated in the plain at the base, and within view of the towering peaks of the blue mountains; it was anciently a place of note, but has decayed latterly, and the Kusbah is transferred

to Cheyoor. It now comprises about 100 houses, principally of the cotton-cloth weavers, comtis, musicians, (*Bajindris*,) dancing girls, Pullaywars, and Brahmans principally of the Smartal sect.

It possesses a temple of some sanctity, and holds a *Jatra* and great cattle fair once a year, in the month Chaitra. The temple, which is dedicated to Iswara, faces the East, and is approached by a bridge built in the old Hindu style as at Bijanugger, that is, formed by slabs of stone resting horizontally on perpendicular stone pillars, sunk in a triple row into the bed of the stream. Near this is a colossal statue of the sacred bull.

The great archbishop, or Swami of the Smartal sect, Sencra Bharti, of Singhery *Math*, has a branch *Math* here, now under charge of Mathmudra, Samana Shastri.

*Coimbatore*.—As the base of the western ghauts is approached, the plain undergoes a gentle but sensible rise. It is now covered with wild vegetation, and its surface more rugged with the channels of the Ghaut streams. Patches both of red soil and regur cover for the most part the subjacent rocks, which the sections afforded by wells, banks of streams, &c. show to be hornblende schists, gneiss, with large beds of quartz, and dykes of basaltic greenstone. The subsoil is generally either a gravelly detritus of these rocks, or beds of kunker from one foot to twelve feet thick; often grey, and ash-coloured. In some places both red and black soils abound in soda and common salt, and excellent saltpetre is extensively manufactured.

The staple articles of cultivation, are cotton, juari, bajra, tobacco, and rice. The Company since my visit have established a cotton farm here, under the able superintendence of Dr. Wight, the principal object of which is the improvement, by a better course of agriculture, of this staple, for European markets; Indian cotton being decidedly inferior to American in this respect; also the trial of the introduction of the cotton plants of other countries, viz. America, Bourbon, &c.

Iron ore, principally the black magnetic sand, is smelted at Topumbetea and Contempully, it is found near Colengoda, and in most of the hilly districts north of the town. According to barometrical observations by Messrs. Baikie and Dalmahoy, the palace of Coimbatore is 1483 feet above the sea's level. This pretty nearly coincides with the height given by the boiling point of water on the ground of the mili-

tary lines, which I found to give 1416 feet. Coimbatore town lies about sixteen miles to the E. by N. of that singular gap in the Western ghauts, the Paulgaut Pass; it is laid out on the surface of a high plain in regular and broad streets, lined with houses having tiled roofs, and verandas in front. The houses have rarely an upper story, and are inferior to those of Salem. Near the middle of the town stand the remains of a palace built or rebuilt by Tippoo, who made it his occasional residence. It is used as a kutcherry and dépôt for tobacco, which is brought here in large quantities from the interior for export to the Malabar Coast. The palace hardly deserves the name. It is a terraced, massive building, with open quadrangles, closed by ponderous gates. A neat mosque is pointed out as also erected by Tippoo.

About a mile on the rising ground to the NE. of the town stand the barracks and officers' quarters, occupied by two companies of Infantry and their officers, from the garrison of Trichinopoly. Here is also the Chapel and burial ground of the Church Mission. The Traveller's bungalow and post office are in the town. The fort is a complete ruin. There are also a Roman Catholic Chapel, four mission schools, and two private English schools.

About five miles westerly, at Perur, is a temple to Siva, called Mailchittumbra, celebrated for its sanctity, and as having been one of three pagodas spared by Tippoo. The others were those of Seringapatam and Mailcotta in Mysore. The natives assert that this temple was built 3000 years ago by one of the Pandion kings of Madura; but I did not find any inscription on stone to corroborate such an assertion.

The temple itself is neither grand nor beautiful; but the style and rudeness of the architecture and sculpture indicate a considerable antiquity.

The province of Coimbatore was formerly part of the Chera kingdom. *Perur*, just mentioned (or the city), is supposed to have been one of its greatest towns, and the Talakad, on the banks of the Cauvery, which separates the northern extremity of Coimbatore from Mysore is said to be on the site of its ancient capital (Dalavanpura.)

I cannot find that the present capital town, Coimbatore, was of any great ancient importance; it probably rose upon the decay of its neighbour Perur. The descendants of the old sovereigns, the Velar Rajas, still exist, I am told.



The physical aspect of Coimbatore, though broken by hills on its northern, western, and southern confines, presents, generally speaking, an undulating open plain, sloping away southerly and easterly from the great break of the Ghauts,—with an average elevation of about 900 foot above the sea. The Cauvery, to which the inferior lines of drainage, viz. the Bowany, Noel, and Amberutty converge, carries off the superfluous water to the Bay of Bengal.

Its area is estimated at about 8,400 square miles, with a population of upwards of 800,000, of which about 8-10ths are engaged in agriculture and weaving. The number of females, according to the census published in the Madras Almanack for 1839, slightly exceeds that of the males, which whether fact or not, is a circumstance worthy of enquiry,—in a country where (among the Mahomedans) polygamy is allowed, marriage a religious duty, and concubinage and prostitution prevalent among all castes and sects. The revenue is estimated to average 21 lacks of rupees annually.

Coimbatore, at an early period of its history, fell into the hands of the Madura Rajas, and in the 17th century was wrested from them by the Mysore Rajas, from whose hands it fell into those of Hyder and Tippoo. The English took it from Tippoo in 1783, but restored it at the peace 1784. Again taken possession of in 1790, repulsed the efforts of Tippoo to storm it, but afterwards surrendered on terms which were violated, and the garrison detained prisoners until the peace of 1792. Since the fall of Seringapatam in 1799, it has formed an integral part of our possessions.

The population of the town of Coimbatore (1840) is said to be from 25,000 to 30,000 souls—composed chiefly of weavers, agriculturists, and merchants, Brahmans of the three chief sects, as at Sankerry-droog. Mussulmans, musicians and dancing girls are numerous here, as might be expected.

Tamul and Canarese are both spoken at Coimbatore, which approaches the southern boundary of the ancient kingdom of Karnata, where Canarese almost exclusively prevails, and also the eastern boundary of Malabar, where Malayalim is the vernacular language of the country.

*Pass of Palghaut.*—This great chasm in the wall of the Western Ghauts is about fifteen miles in average breadth from N. to S. and

about twenty-eight miles long from E. to W. It is about twenty-eight miles wide where it opens upon the Malabar coast, and twenty-two at its debouchment on the plains of Coimbatore ; between these points its width is irregular, but it narrows in some parts to eight or nine miles. Its surface, and the lower flank of the Ghauts on each side, are covered with elephant jungle and thickets of bamboo growing in a thick reddish and grey soil, which cover the rocks, and are great obstacles with the jungle to geological examination. Glimpses are occasionally obtained in passing through this forest of the lofty heights of the Nilgherris and Koondas, which flank the right of the Pass, some of which tower 2000 feet above it, and of the mountains, which resume the line of elevation on the left.

The bottom of the Pass is a plain, gradually rising toward the west by rocky undulations running parallel with the line of elevation, which cause alternate rises and falls in its surface. The ascent from Coimbatore and the descent to the sea-coast on the other side are so gentle, that I conceive it probable that the height of the Pass never much exceeds that of Coimbatore itself.

The boiling point of water makes the town of Palghaut on the Western slope 7-10ths of a degree lower than that of Coimbatore. Down the middle of the Pass winds the Ponani river to the Malabar Coast, and the Indian sea. It is formed by rills from the Ghauts uniting in the centre of the Pass west of the water-shed.

The rocks observed in the Pass, and on its Northern flank, were chiefly of gneiss and hornblende schist, massive hornblende rock, and a small grained quartzite granite, with both black mica and hornblende : the mica is occasionally wanting.

The mass of gneiss on which the Traveller's Bungalow at Woli oor stands, is of the variety which is termed by geologists granitoid, or thick-bedded gneiss, and by others, laminar granite. This however though its structure may appear granitic in hand specimens, is evidently a stratified rock, and is seen, a few miles westward, to pass into a beautifully characteristic, stratified gneiss, which imbeds small black shining scales of mica, and a granular white quartz in alternate layers.

A large grained granite penetrates the gneiss, often containing large reddish crystals of foliated felspar, greenish felspar coloured by actinolite, and occasionally adularia.

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The strike of the stratification is generally W. 5° N., and dip 80° S. 5 E. Stratification, with the help of a telescope, is seen beautifully distinct in some of the highest bare peaks which occasionally overlook the Pass;—for example, North of the hamlet of Ganjicota, where the Pass opens out to the Westward.

The sand brought down the mountain sides by rills and streamlets, consists chiefly of quartz and mica, with magnetic iron sand, and occasionally particles of gold found after heavy rains, comminuted garnet and hornblende, and rusty ferruginous particles. Bits of the bronzite and hyperstene varieties of hornblende are also met with in thin beds.

The surface soil, when mingled with the decayed vegetable matter of the forest, forms an ash-grey coloured mould, soft and friable to the touch; this is the prevailing soil. Around protruding rocky masses, the usual reddish alluvium and detritus from the surrounding rocks, prevails.

The subsoil is usually a bed of angular gravel, the under fragments of these rocks. Beds of clay and kunker are occasionally substituted.

While journeying through the forest, the more than midnight silence of a tropical noon was suddenly disturbed by the loud crashing of the tall, dry clumps of bamboos, and underwood of the jungle in front of us, as if some infuriate elephant was advancing upon us in all the frenzy of the periodical madness these animals are afflicted with. Raising our eyes in haste, we beheld a tall white column of dust madly gyrating here and there, high above the highest trees of the forest, whirling about fragments of sticks and leaves, the wreck of the bamboo clumps in which its lower extremity was performing most destructive gambols.

After crashing about for some time, its lower half, like that of a water spout, separated from the upper or more celestial portion,—which curling upwards gathered itself into a canopy, or cloud above our heads, from which dropped the heavier particles it had whirled into mid-air; then gradually dissolving it vanished, leaving the forest to its former death-like stillness, after a temporary disturbance of three minutes.

Such is a *Peshash* (a devil) in the jungle.

The Thermometer stood in the shade at  $116^{\circ}$ , and a death calm prevailed in the surrounding atmosphere.

*Puducherry*.—Near the little fort of Puducherry, which is in the Pass, the laterite of Malabar (for the Salem boundary was crossed near the Ponani stream) is seen resting on gneiss; between this and Palghaut the country is less jungly, but still well wooded, with fine trees.

*Palghaut*.—This town, fort, and military station stands near the opening of the Pass on the Malabar coast, and is about fifty-two miles direct distance from the sea, and about four miles W. of Puducherry. The Ponani stream is navigable for boats to within fifteen miles of Palghaut.

The town is almost surrounded by the Agrarums of Brahmans and enclosed estates of wealthy Nairs: it is laid out into neat streets: the houses look clean, and are usually tiled or thatched with the bamboo and palm leaf.

The pagodas here and elsewhere in Malabar, (the old Malayalam kingdom) differ from those of the Carnatic and Balaghat in being covered with conical tiled roofs, like a Malay mosque, and in wood being largely employed in their construction. The different physical features of the country account sufficiently for this difference in the religious architecture of the Malayalam nation. Granite is scarce, and usually lies at a distance: the porous laterite would make indifferent roofing slabs; whilst the great forests of Malabar yield a never failing and cheap supply of the finest timber.

The roofs of the pagodas terminate in the usual gilded *Calas*. The colossal equestrian statues so common in the Chola kingdom, are now no longer seen, but in their room we have the isolated granite blocks of Carculla carved into the gigantic statue of Gomuta Raya.

The fort stands on the commanding ground on which the Military lines are built, about three-quarters of a mile easterly from the pettah.

The fort is small, but well put together, of stone, in shape quadrangular, and consists of a curtain flanked by round bastions; the whole surrounded by a wet ditch, covered-way, and glacis. The only gate faces the east, and is protected by an outwork in the European style,

the work, probably of some French engineer in the service of Hyder, who is said to have built the fort itself, in 1766, but at all events remodelled it.

The parapet is high, pierced with loopholes for musketry, and the bastions with embrasures for guns. I counted about forty guns, rusty and apparently unservicable, lying about the place.

Palghaut is now the head-quarters of a regiment of Native Infantry : It is the key of the Coimbatore and Salem districts, from the western coast.

It used to be noted for the manufacture of furniture. Rice is the staple article of cultivation. The mountains in the vicinity can supply large quantities of teak and other valuable timber. The pepper and cardamum flourish on their sides and in their defiles ; and their forests shelter herds of bison and elk, whose horns form an article of traffic.

Palghaut before Hyder's time, was under a Wair Raja, who was in some measure feudatory to the Hindu Rajas of Mysore.

On their downfall, it fell into Hyder's hands, who strengthened it as a Military post, commanding the only communication with Malabar from Coimbatore.

It was early seized by the English in their wars with Hyder ; evacuated 1768, by Lieut. Bryant ; retaken 1783, by Col. Fullarton ; again fell into the hands of Tippoo, but retaken in 1790, by Col. Stuart.

The Pass of Palghaut, as might be anticipated, exerts a considerable influence over the meteorology of the places to the East and West of it. In the SW. monsoon while the table lands of the Balaghat, and the plains of the Carnatic, sheltered by the great wall of the Western Ghauts, are burnt up with the rays of a scorching sun, the places immediately to the East of this wide gap are favoured with a portion of the cooling showers and breezes which are wafted through this mountain opening over the forests of Malabar from the Indian ocean.

On the other hand, it serves as an outlet to those furious storms from the Eastward, which sweep the Bay of Bengal, and after traversing the peninsula, burst forth through it to the Indian sea.

*Vaniencolam*.—This is a village in South Malabar, about twenty-four miles and a half W. by N. from Palghaut. Like most Malabar villages in the interior, it consists of huts in separate enclosures,

shaded by the cocoa, areca palm, and the jack, spreading over a large area, the surface of which is diversified with two wooded hills, and watered by numerous mountain rills.

The Traveller's bungalow stands on one of these low eminences on a bed of laterite resting on gneiss. The gneiss is hornblendic, strike of strata W.  $50^{\circ}$  N., and dip  $86^{\circ}$  S.  $5^{\circ}$  E.

The soil is red, and often consists of a barren laterite detritus. A well, twenty-four feet, is cut in the laterite.

A market for salt fish from the coast, cotton cloths from Coimbatore, &c. is held here every Saturday. Approximate height above sea by boiling point, 393 feet.

*Waliyar.*—A tiled Bungalow for the accommodation of travellers, has been erected by a liberal native banker of Coimbatore, named Bismam Singh, in this forest hamlet, which consists only of a few rude huts. The surrounding jungles are rather notorious for being the favourite haunt of the tiger and elephant at certain seasons. Few instances, however, have been recorded of their attacking travellers. The natives affirm it is dangerous to sleep here during the cold months of November, December and January, on account of a jungle miasma which engenders fever. Laterite is the prevalent surface rock.

The approximate height above sea by boiling point 283 feet.

*Tirtalla.*—This is a large village in S. Malabar, a few miles from Palghat,, about sixteen miles direct distance from the sea at Panani. It is pleasantly situated in a valley, flanked by hills of gneiss and hornblende schist partially overlaid by laterite, on the banks of the Walliyar or Ponani river. The strata of gneiss, which is highly weathered, run E. by S. and dip  $45^{\circ}$  toward the S. The banks of the river consist of a loosely consolidated laterite clay and sandstone overlying a bed of a stiff black carbonaceous clay. It is not improbable that lignite and mineral copal exist in this vicinity, as I found a small fragment of the latter in the river bed. The sand which covers it, is quartz and micaceous. On digging to the depth of five feet, I found layers of a white coloured sand alternating with sand of a ferruginous colour and thin layers of a dark brown clay passing into black.

The soil in the rice grounds is a sandy clay mingled with decayed vegetable matter.

The staple article of cultivation here is rice, and the prevailing castes, are Namburis, Tiars, Moplays, Churmars and Vellalis.

In the jungle I saw some of the squalid aborigines of Malabar,—the Neadis—who reminded me in feature and lowness of stature of those of the Malay Peninsula, and of the Chensu-var, inhabiting the jungles of the Eastern Ghauts.

*Betiagady.*—The houses, or huts rather, composing this Malabar village, are scattered as usual over a large space of ground. The flat, cultivated rice vallies run down towards the sea, flanked by steep, low ranges of laterite, like so many rivers enclosed by banks. The soil is lateritic, manured chiefly with decayed vegetable matter and wood ashes.

Staple article of cultivation, rice ; and the prevailing castes much the same as the last march. The Traveller's bungalow stands on a low hill of laterite, which by the boiling point is about 320 feet above the sea.

The temperature of water in a well twenty feet deep, in laterite, was 82°. Of air in shade at the time (March 23rd, 5 P. M.) 87°.

*Beypoor.*—The sea is first seen at Beypoor, a large village at the mouth of the Beypoor river, Lat. N. 11° 12', and Long. E. 75° 52'. The cliff on which the Traveller's bungalow is pleasantly situated, is of laterite. It is on the north bank, and commands a good view of the embouchure and bar. The prevailing rock is laterite, running down in low flat topped ridges from the interior, separated by flat bottomed tortuous vallies, which have been evidently scooped in it when the land was uplifted from the bed of the sea. These ranges usually terminate in precipices of from forty to one hundred feet high at the sea.

The laterite embeds layers of lignite associated with sulphates of iron and alumina (the result probably of the decomposition of iron pyrites,) and occasionally mineral copal. The largest bed of lignite occurs at the base of the cliff of lateritic sandstone, which overlies it a short distance up the river, on its right bank, in a bed of black and grey micaceous slate clays and shales.

Beypoor was formerly a favourite sea-port of Tippoo, who styled it Sultan-patnam, the city of the Sultan ; he constructed a fort on the river, warehouses, and an arsenal.

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The Portuguese formed an early settlement here. The ruins of this fort are still pointed out by natives on the sand bar. The river is navigable during the monsoon many miles into the teak forests of the interior, and affords a capital mode for the transit of ship-building timber, by rafting to the coast. A low mill with sails moved by the wind is standing, but I believe no longer in use. A large quantity of timber is still shipped for the supply of the Dock-yards at Bombay, and large vessels (to 700 tons) are occasionally built here. Sail-cloth is manufactured, and excellent tar from teak-wood shavings and saw dust.

The village contains about 400 houses, inhabited chiefly by Tiars, Mairs, Polliars, Churmars, Soottars, Mukkoons; with a few Nam-buri Brahmans, Kunnishuns, and Moplays, and has a busy thriving appearance.

The Beypoor river is one of the most considerable in Malabar. It will admit vessels of 300 tons within the bar, and it is navigable during the greater part of the year to Ariacode, twenty-five miles, and during the monsoon to Nellumboor, the principal teak forest, forty-four miles. In its sands after the rain, and along the sea-coast, gold dust is frequently found in small quantity.

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# JOURNAL

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*Review of L'HISTOIRE DU BUDDHISM INDIEN, par E. BURNOUF. By Dr.  
E. ROER.*

It is with great satisfaction, that we hail the appearance of a work, which will, we suspect, form an epoch in our knowledge of Buddhism. Seeing the name of the author at the head of this "Introduction to the History of Buddhism" important results were to be expected from his knowledge of Sanscrit and of Pali literature, but we did not anticipate, that a great part of his researches was based on Sanscrit sources. It is indeed singular, that our first information about Buddhism should have been derived from secondary sources; from the Burmese, the Moguls, the Chinese, &c. and should only gradually have returned to its main spring. Our first acquaintance with Buddhism was in fact not of a kind to invite research; the mixture of extravagant fables, apparent historical facts, philosophical and religious doctrines was so monstrous, that it seemed to defy every attempt to unravel it. There were architectural monuments in abundance, which bore witness to high ancient civilization among Buddhist nations, but in referring to their traditional or written records, which alone could give language to those relics, enquiry was startled at their incoherence and inconsistency. The researches of Abel Rémusat, especially on the Buddhist writings of the Mongolian nations, threw the first light on these mysteries. He was closely followed by F. J. Smith, and from Chinese authorities by

Klaproth, Landresse, A. C. de Körös, whose indefatigable zeal and perseverance opened new sources for the history and religion of the Buddhists in the literature of the Tibetans. About the same time the excavations of Buddhist monuments in the Punjaub and other places, secured a geographical basis for the empires of the Buddhists, and the coins found in the topes, with the decyphering of their legends by J. Prinsep, brought to light a series of facts, which were of the highest importance to true history. All these results were eminently corroborated and illustrated by an ancient Buddhist work, written in Pali, the "Mahawanso," of which a translation into the English was published by the Hon. Mr. Turnour. From a different quarter of India the numerous communications of Mr. Hodgson on Buddhism in Nepaul, and his discovery of an immense number of Buddhist works, written in Sanscrit, excited the highest interest; but a critical examination of these books not having been given, no dependance could be placed upon these illustrations otherwise so valuable. The present work of Mr. Burnouf is the result of such a research, and through it we have returned to the central source of the Buddhist writings, from which all others, with exception of the Pali, are only radiations. It owes its origin to a number of Sanscrit manuscripts (80) which Mr. Hodgson collected in Nepaul, and which, with his disinterested liberality in promoting the cultivation of Oriental studies, he presented, about the end of 1837, to the Asiatic Society of Paris; a liberality, the first fruit of which is this remarkable work of Burnouf, who does not fail to do full justice to the noble disinterestedness of Mr. Hodgson. There are very few scholars capable of undertaking a research into the materials. As a fortunate combination of circumstances had concentrated at Paris all the first and secondary sources for the history of Buddhism, a man was required who united to a profound knowledge of the ancient languages of India, an acquaintance with the modern languages and literature of the Buddhists, the critical tact of the philologist and historian, and the comprehensive grasp of the philosopher, qualities, which in E. Burnouf are most happily blended together. It is certainly not an easy task to go through eighty large manuscript works, written in a barbarous language, made often unintelligible by the ignorance of the copyist, to analyse the contents of all, to bring them in their true chronological order, to compare them with the documents of other nations, written

in a different language, and lastly use them as sources for the history, religion, and philosophy of the Buddhists.

The Buddhist religion claims in many respects a peculiar interest. The changes it has undergone are most remarkable. Having overcome the religion of the Brahmans on its own ground, having swayed by its kings the greater part of India, it has been banished from its native soil so entirely, that it is almost forgotten there by the bulk of the population, while its followers in other parts of the earth are more numerous than those of any other religion. It is an undeniable fact, that a great part of mankind were humanized by it, and that for the civilization of central and western Asia it has done the same, as Christianity has for the barbarians of Europe.

But a higher interest is connected with its history for the philanthropist. Has Buddhism been able to produce such a religious revolution in India? Has it been able to overcome the intellectual barrier with a great number of the Hindoos, the tenacious adherence to their religious impressions? We may also perhaps be able to exercise a similar influence on the Hindoo mind, to break the instinctive resistance against a religion which reveals the true aim of mankind, and is connected with all the progress which mankind has made in science, in art, and in the true spirit of government.

And in this respect the annals of Buddhism should be attentively studied. Truth in itself alone is not sufficient to eradicate errors, which a long habit has accustomed people to consider as their most sacred inheritance; the mind of man being not prepared for a religious or even a scientific truth, will reject it. As regards the propagation of religious truth among a people, its character, habits, institutions should be intimately known, before a lasting impression can be made on them. The Buddhist annals are in this respect especially instructive, showing the means, by which they succeeded in converting a people, every institution of which is calculated to perpetuate its religious associations. Among the many important results, which are the fruit of Burnouf's researches, we will here notice one, which appears to us of immense importance to the future studies of Indian antiquity; it is, that there is established beyond doubt the higher antiquity of Bráhmaism; and before we enter into a description of the work itself, we beg to be permitted to consider this object from another point of view than that in

which Burnouf regarded it, in the hope, we may contribute to remove some prejudices, which obstruct not only the study of the history of Buddhism, but of all other religions.

The question, whether Buddhism or Bráhmaism be the more ancient religion, has not yet been decided to general satisfaction, though there should not be any doubt about it among those who have studied Indian antiquities. The incertitude, which still prevails on this subject, appears to originate in the opinion of men, who not paying sufficient attention to a most authentic document,—the ancient Sanscrit literature, allowed their judgment to be swayed by modern Buddhist sources. And even these were not critically examined by them, as the Buddhists themselves explicitly, as well as implicitly, acknowledge the higher antiquity of the religion of the Védas.

It is not difficult to discover the cause of this predilection for the antiquity of Buddhism. We have above remarked, that the religion of Buddha, as derived from more modern documents, offers an inextricable web of history, legends, religious and philosophical tenets, which appear to some, to have a close affinity to Christian doctrines (for instance, to the dogma of the Trinity); to others, with the assertions of some ancient Grecian philosopher; in a word, the *apparent* depth of some opinions, combined with the *apparent* want of historical documents, throws it back also into the depth of time. There is with many persons inclination to interest themselves in every thing which bears the semblance of remote antiquity. An event that disappears in the mists of time, has for them an enchantment which the most excellent historical statement of the real connexion of cause and effect would fail to excite, as it thus would be encompassed in the notion of every-day phenomena.

The Buddhists themselves, although in sad contradiction with their own statements, have always shown an inclination to push back as far as possible the origin of their doctrine, or in other words, to pronounce their religion without beginning and end, a proceeding, which is quite in accordance with their position. The question of their opponents, why Sákya Muni did not appear in any former period, was cut off by the doctrine, that the universe always is under the government of a Buddha. This assertion however well it accords with the wishes of the Buddhist, has not the least foundation in the eyes of the critic.

We willingly admit, that Buddhism has for the critic and historian a peculiar interest, but of an opposite kind ; which is, that a religion, which, as regards even its origin, appears to belong to an advanced state of society, and which in all its stages manifests elements of a doctrine intended to be propagated,—that such a religion should at the same time recoil into the darkness of a primeval period. It is the peculiar object of the enquirer to raise the veil which was, as we may safely assert, woven in after days ; like as with the pretensions of Bráhmaism to indefinite antiquity, made at a more recent period.

On the other hand we may assert, that the darkness into which the origin of many religions is plunged, cannot be removed, because such darkness is, as it were, cause and consequence of their origin.

A religion which is produced by the human mind, without being dependent on former religious opinions among a nation, but is rather the commencement of its religious convictions, has neither consciousness of itself, nor falls within the range of history. There is the same obscurity with regard to it, as with regard to language, the origin of which we may comprehend as a necessary effect from general causes in human nature, without being able to trace it by historical documents.

We now assert, that Buddhism is no primitive religion, but one of those, which are founded on the development of preceding religious opinions.

Religion has the same object with philosophy, which, however, is attained by either in a different way ; religion perceives its object by belief, while the other endeavours to realize it by knowledge. Both depend on the idea of infinity. As certainly as man has the idea of finite things, so has he also the idea of an infinite nature ; both are correlate ideas, and religion therefore is founded on the nature of man. By religion we believe in our connection with infinite power ; by philosophy, we attempt to trace it by a succession of arguments. Being both alike in their object and commencement, they must also have a similar development, or the steps which the one has to go to the goal of its perfection, are represented likewise in the other.

Philosophy in its origin has two characteristics ; first, it is simple, or the object of knowledge is perceived in its simplest relations ; and, secondly, all its principles as well as its explanations are material. The

material causes and explanations are not even comprehensive, but are limited only to certain phenomena of nature. The next step in the march of reason, is to collect all these phenomena in one view, as well as to reflect upon the forms, in which they appear in our mind. When this circle of natural causes, of their being reduced to one and the same (material) cause, and their mode of connection with our perception has been completely passed through, when by this process the various stores of learning, and a progressive power of reflection and reflected notions have been produced, the mind will be perceived in its contrast with material nature, that is to say, as perceiving, as comprehending a variety of objects in one and the same view. This stage of philosophical reflection is impossible, without being preceded by the former,—the materialist consideration. At first, however, the more obvious acts and faculties of the mind are only perceived, that is to say, in its difference from nature, and only when they have been examined, are the various manifestations of the mental activity submitted to investigation; the mind appears then as a moral agent, and it is then the highest destination of mankind to realize a hierarchy of moral ends.

It is evident, that in this exposition, the assertion is not included, that on the first stage of the philosophic development of the human mind, no notions of mental acts should have existed; on the contrary, they undoubtedly existed; for it is in the nature of the mind to be conscious of its acts; but this consciousness is first found in an unreflected perception; as a clear, well defined notion it cannot exist, until by a series of opposite notions, the nature of the mind becomes manifest. The same law exists, as regards the perception of moral ends, which, however, is not necessary here further to discuss.

Religion follows the same steps in its development. Powers of nature, or objects of external perception, have been first worshipped as the gods of man. They are, for instance, the elements, water, earth, fire, ether, or phenomena of short duration, though of overwhelming power, as the clouds, thunder and lightning, &c.; or objects on the sky, as sun, moon and stars. In the *Védas* prevails an adoration of the elements and the starry sky; the Greeks previously to the worship of the Olympian gods, adored *Uranos* (sky), *Gaia* (earth), *Chronos* (time), &c. In a later period qualities of the mind are attributed to the gods, as we find the gods of Olympus, or the gods of the Indian pan-

theon, which was produced after the period of the Védas, until the gods are considered as the moral rulers of the world.

Let us now apply these criteria to the religion of Buddha to see, whether it belongs to the primitive religions, or to those which can only arise in a more advanced age of mankind. First, its views of the world are not simple; we find therein a developed theory of the material elements, of an eternal circle of life and death, of a necessary connection of causes and effects; of infinite spaces and times, &c. together with almost all the gods of the Bráhmans. Further, the view of the world is not material, but there is clearly perceived the difference between mind and matter, a doctrine of the origin of all mental and material elements, from one element, which transcends the perception of our senses, and which in fact is the void, the nothing, a view which undoubtedly requires a far advanced abstraction. Further, as regards the mind, many different stages of its development are distinguished, and it is explicitly stated, that it is the destination of man to pass through all these stages, to liberate himself from all the trammels of nature, and to aspire by his own efforts to the highest degree of spiritual existence. Lastly, the moral element prevails in Buddhism; it is essentially a religion, in which the highest object is Dharmma, the realization of the moral law by a finite being, as the only means of receiving true liberation from the evil of life, and obtaining the state of a Buddha.

This explanation goes far to prove, that Buddhism is not simple, that all its elements are based on a previous development, and we may therefore safely assert, that it is not a primitive religion, but the result of religious ideas, previously cultivated in the people; or, with one word, Buddhism belongs to history, and if its documents be not lost, we must be able to trace its origin. The native country of Buddhism is India, and as there was no other religion but Bráhmanism, this must have been its parent. If this be true, it cannot be difficult to show that form of Bráhmanism to which it owes its existence. We, however, conclude here this exposition, which we made only for the purpose of contributing to settle a question which has too long been a matter of discussion to Oriental scholars, and return now to our immediate object.

As we already observed, Burnouf's work gives the historical evidence of the connection between Bráhmanism and Buddhism. It introduces us into the very circumstances from which Buddhism arose.

The more we advance in the perusal of his book, the darkness as to the mysterious origin of Buddhism is gradually dispelled, and we commence to get an insight into the very motives of its founder and its first apostles; in a word, we recognise in it a work of human intellect.

Mr. Burnouf endeavours first to establish the place, which the Sanscrit books of Nepaul claim to occupy among the Buddhist literature in Asia, and after a careful comparison of the great Tibetan collection of Buddhist works, of which Mr. A. C. de Körös gave a detailed and able analysis in the *Journal of the Asiatic Society*, of Mongolian and Chinese Buddhist works with the Nepalese collection, he comes to the conclusion, that all of them are translations from the Nepalese books.

It is a fact, he says, proved now to evidence, that most of the sacred books of Tibet, Tartary and China, are only translations of the texts, discovered in Nepal, and this single fact marks positively the place of these texts in the series of documents which the Asiatic nations have furnished for the general history of Buddhism.

Ancient Buddhism has, according to the author, only two true sources, the Sanscrit works of Nepal, and the Pali collection of Ceylon, of both of which he made use in his researches.

The results of them are presented in the following order. His work is divided in three parts or memoirs. The first memoir is to describe, according to the Nepalese tradition, the Buddhist collection, discovered by Mr. Hodgson. For this purpose it is to enter into the necessary details concerning the great divisions of the sacred writings, admitted by the Buddhists of the North, by which it will be decided, whether they had been written at different periods or not. This memoir will somewhat dispel the obscurity of the first times of Buddhism, and at least decide the long controverted question of the comparative antiquity of Buddhism and Bráhmaism. The second memoir, which will be published in a subsequent volume, is to examine the Pali books of Ceylon; and the third, to compare both collections and the traditions in the North and South concerning them. From this, says the author, will result the conviction, that there are two editions of the Buddhist works, the difference of which generally consists less in the matter than in the form and classification of the books; and secondly, that the true elements of ancient Buddhism must be looked for in what is common in either edition.



We now follow Mr. Burnouf into the description of the collection of the Nepalese works.

The Buddhist collection of Nepal, he says, is composed of a great number of works, the titles of which announce treatises of very different kinds.

Mr. Hodgson has published two long lists of these titles, which may be completed from the analysis which C. de Körös has given, of the Tibetan collection.

We do not possess in Paris all these works, but the eighty Buddhist volumes, which we owe to Mr. Hodgson, probably contain the most important part of the religious collection of Nepal.

The books, which are now extant, are divided into three classes, under the collective title Tripitaka. They are the Sútrapitaka, or the discourse of Buddha, the Vinayapitaka, or the discipline, and the Abhidharmmapitaka, or the manifested laws, that is the metaphysics. This division, justified by the texts, is at the same time one of the bases of classification of the Kah-gyur, and is also familiar to the Chinese Buddhists, who explain it by the three words: sacred books, precepts, and discourses.

The word Sútra denotes in the ancient literature of the Bráhmans short, and obscure sentences, which contain the fundamental rules of the Bráhminical sciences from grammar to philosophy. Though the word in this application is not unknown to the Buddhists, they use it also in another sense, and the treatises, which bear the title of Sútras, have a very different character from those known by this name in the Bráhminical literature. The Sútras, according to the Nepalese authorities, quoted by Mr. Hodgson, contain the sayings of the Buddhas; they are therefore often called "Buddha Vachana," the word of the Buddhas, or Múlagrantha, text-books. These books are ascribed to the last of the Buddhas, viz. to Sákya-muni, and in consequence occupy a very elevated place among the Buddhist literature in Nepal. The Sútras by their generally simple form and language, preserve the visible trace of their origin. They are dialogues, relative to ethics and philosophy, in which Sákya plays the part of teacher. Far from presenting his thoughts under the concise form, which is so intimately connected with Bráhminical instruction, he commits repetition, which, though fatiguing, bears the character of real preaching. There is a wide abyss between

his and the Bráhmínical methods; instead of the mysterious doctrine, entrusted almost secretly to a limited number of hearers, instead of formulas, the studied obscurity of which seems as well to discourage the penetration of the disciple as to excite it, the Sútras present round Sákya a numerous assembly, composed of all those who desire to hear him. This vast difference is founded on the essence of Buddhism, a doctrine, in which proselytism is the characteristic feature; which proselytism, however, is only the result of the universal benevolence and charity, which inspire Buddha, and which at the same time are the cause and the end of his mission on earth.

The title of the second class, Vinaya, signifies discipline. The Chinese Buddhists understand this term in the same way, and Mr. Rémusat defines it, the precepts, the rules, the laws or ordinances, literally the good government. The signification of this term is therefore clear, but by a singularity, which appears difficult to be accounted for, the collection of Mr. Hodgson does not present, with the exception of some short treatises on religious practices of little importance, works which belong to the class Vinaya. Why then is not the class Vinaya represented in the collection of Mr. Hodgson? The attentive examination of some volumes of the Nepalese collection, compared with the works, mentioned in the Tibetan Kah-gyur, solves this difficulty. In studying the analysis made by Csoma, I found there a certain number of treatises with titles, which also occur in the Nepalese collection. These treatises in general belong to the same class in either collection, and a work which, according to the double authority of the Nepalese tradition and of the manuscripts, is called Sútra, is classed according to the Tibetans, under the category of the Mdo, that is to say the Sútras. The collection of Mr. Hodgson, contains a great number of small treatises under the title Avadana, which has as large an application as the title of Sútra, and I even believe, that the number of Avadanas is greater. Several of these treatises, however, have exactly the form of Sútras, and a strict classification would compel us to separate them from the works which bear the title of Avadana, but do not possess the character of a real Sútra.

The third division, the Abidharmma pitaka, contains in part the metaphysics, and in general the opinions, of the Buddhists concerning all that exists.

This classification of the books of Sákya, as it is found in the commentary of the Abidharmma Kósha and in the analysis of C. de Körös, appears to give the same authority to all the books. A more attentive examination, however, shows some differences between them. Thus I find some passages in the Abidharmma Kósha from which it may be inferred, that the Abidharmma does not directly emanate, nor with equal title, from the preaching of Sákya. The author of the above-mentioned treatise says for example, expressly, the book, which contains the metaphysics, is not derived from the word spoken by the Buddha.

Mr. Burnouf in his more special examination of the Sútras, has chosen two fragments of the Nepalese collection, known under the title of Divya avadána, in which (fragments) he recognises the characteristics of the Sútras. The first refers to the period of Sákya-muni Buddha, and reveals some proceedings of his preaching; the second is a legend of a mere mythological character, which Sákya relates, to show the advantage and recompense of giving alms.

Sákya recommends in them the practice of the duties, which are the objects of his doctrine, and he shows the importance of them by the recital of the merits assigned to them, who act in accordance with them. He very often confirms his doctrine by relating events, which in a former life happened to him or to his disciples, admitting, as the Bráhmans, that all beings are condemned by the law of transmigration successively to pass a long series of existences, where they obtain the fruit of their good or bad acts. Sútras of this kind are very similar to legends, strictly speaking, and in fact they differ from them only in external characteristics of no great importance. A Súra always commences with this formula: "Lo, what I have learnt", while this formula is wanting in all the Avadánas which are known to the author. It must be also said, that the legend forms the basis and the appropriate matter of the Avadána, while it is only an accessory to the Súra, and serves only to confirm by an example the instruction of Buddha.

The identity of the title which exists among all these treatises, the Sútras, the Mahayasa Sútras, and the Mahaváipalaya Sútras, announces at the first glance great similarities. The examination of the texts, however, does not fully bear out this presumption. A Súra of the fuller or developed class is, as regards its form, a true, and real Súra, it

commences and terminates with the same formula, and is, as the simple Sūtra, written in prose, with a more or less numerous intermixture of versified passages. It is moreover dedicated to the explanation of some one or other point of doctrine, and the legends are also subservient to example and authority. But here ends the resemblance, and numerous differences will be found, which are of such importance as to render the classification of these two kinds of Sūtras in the same category improper.

A simple Sūtra as written in prose, a developed one in prose mixed with verses, and the poetical portion, is merely a repetition of what is written in prose in another form.

If these observations are true, we have a certain character by which to divide the Sūtras into two classes, the first containing Sūtras in the strict sense of the word, which are the most simple and probably the most ancient; the second comprehending the Sūtras of fuller development, which are more complicated, and therefore more modern.

To this character is added another which separates, as regards the form, the simple from the great Sūtras. The verses introduced into the former, do not differ in language from the body of the same treatise written in prose; verse and prose are both Sanscrit, while the poetical parts of the developed Sūtras are either written in an almost barbaric Sanscrit, or confounded with forms of all ages, Sanscrit, Pali and Pracrit.

The Buddhist compositions of the North are not written in the epic style, the noble and at the same time simple style of the Rāmāyana and Mahābhārat, nor in the rich and coloured language of the drama, nor also in the monotonous idiom of the Puranas, nor lastly in the compact, though a little obscure, prose of the commentators. Their style differs from all of them. The Sanscrit words have often acquired new acceptations. The language of the Buddhists has followed the march of their ideas; and as their conceptions in a marked degree, differ from those of the Brāhmins, so their style is very different from the learned language of the latter.

p. 105. The simple Sūtras have also not the fastidious developments of the longer ones. There Buddha is generally placed in a central town of India, in the midst of an assembly of the religious, met to hear his preaching, and this assembly is sometimes increased by a multitude of gods; in the great Sūtras, however, the assembly consists of an exag-

gerated number of religious men and women, of gods of all classes, and of Bódhi-sattwas, while in the simple Sútras these latter never make their appearance.

p. 120. The idea of one or more *superhuman* Buddhas, and of Bódhi-sattwas, created by them, is as foreign to these books, as that of an Adhibuddha, or of a god.

p. 121. With all the attention I have bestowed on the simple Sútras, I cannot discover the least trace of that vast mythological machinery, where the imagination luxuriates through infinite spaces in the midst of gigantic forms and numbers. I have only found Buddhas, who are considered human beings, and of whom Sákya is the last, and I have not even found a passage in which the qualification of human Buddhas was not given them, while the conception of a Buddha, who should not be a man, having attained the highest degree of holiness, is beyond the circle of ideas, forming the foundation of simple Sútras. In one word, the Buddhas, previous to Sákya, have by no means the divine character of the Buddhas of contemplation, they are men as himself, the sons of Bráhmans or of kings.

p. 128. The simple Sútras illustrate a very important point in the history of Buddhism, viz. its connexion with Bráhmanism, on which point the merely speculative treatises preserve an almost complete silence. This circumstance alone suffices to establish the opinion, that these Sútras were composed, when both religions were cotemporaneous, in the same way as the presence of Buddhist anchorites in several Bráhminical dramas, proves the dramas to be written at a time, when followers of Buddha were still in India. The study of the Sútras, considered under this point of view, affords a new confirmation in favour of the opinion, according to which I place these monuments nearest to the preaching of Sákya.

It solves moreover in the most decisive manner a question, the discussion of which has been lately renewed, viz. of the comparative antiquity of Bráhmanism and Buddhism, on the ground, that most epigraphic monuments in India belong to Buddhism, (page 129,) and not to Bráhmanism. Without entering into an examination of these monuments, which, I must say, are not yet studied with sufficient attention and critical discretion, I observe, that from the existence of ancient Buddhist inscriptions in Pali, and even from the priority of these inscrip-

tions to Bráhmānic monuments of the same class in Sanscrit, it may be inferred, not that the Pali is prior to the Sanscrit, which is impossible, not that Buddhism is prior to Bráhmanism, which it is not less impossible, but that the regard for history and historical proceedings has been earlier displayed amongst the Buddhists than amongst the Bráhmans. What more can, however, now be adduced in the presence of the formal evidence of the sacred texts of Nepal, in which the whole Bráhmānic society with its religion, castes and laws appears? Can it be pretended, that the society the existence of which is borne out by these books, was originally Buddhist, and that the Bráhmans, who afterwards became its masters, have borrowed from it certain elements to which they gave the form, in which we find them in the laws of Manu, or in the time of the Rámáyana and Mahábhárata? Or rather, is it imagined, that the names of the gods and the Bráhminical castes, of which the Sútras are full, have been introduced all at once? And if so by whom? By the Buddhists perhaps, to give themselves the honour of superiority, or at least of equality with regard to the Bráhmans, which they could not retain in India; or perhaps by the Bráhmans to assign their existence to a much more ancient epoch than it really was? In the first place, as if the compilers of the Buddhist books could have had any object in showing Buddhism separating itself from Bráhmanism, unless the Bráhmanism had existed in their time; or in the second place, as if they would have allowed the Bráhmans to bring in by stealth their abhorred name among the names of Sákya and his disciples. We cannot escape the following alternative: The Sútras, attesting the existence of the Bráhmanical society, are either written about the period of Sákya, or a long time afterwards. If the first, the society, which they describe, must have existed, because one cannot conceive for what purpose they should have given all the detail of a society, which did not exist, at the time of Sákya; if the second, one cannot better understand, why the gods and Bráhminical personages occupy there so vast a place, because a long time after Buddha, Bráhmanism was totally separated from Buddhism, and they had then only one common territory, that of polemical discussion and of discussion with the sword. Mr. Burnouf does not enter into all the indications which prove, that at the period when Sákya traversed India to teach his law, the Bráhminical society had approached its acme, but he notes two points, its religion and its political organisation.

The gods, whose names appear in the Sûtras, are Náráyana, Siva, Varuna, Kuvéra, Brahmá, or Pitamáha, Sakra or Vásaava, Hari or Janárdana, and Samkara, which is only another name for Siva, and Viswakarman. After them a number of inferior gods are mentioned, as the Dévas, Nagas, Asuras, Yakshas, Garudas, Kinnaras, Mahóragas, Gandhavas, Pisachas, Dánavas, and other good or evil genii. At the head of the secondary deities figures Indra, generally under the name of Sakra, or Sachípati, the husband of Sachi. His name is most frequently of all found in the Sûtras and legends. There he generally appears before Sákya, with whom he has frequent conversations, and receives the name of Kaúsika, which title he has also in the Upanishads. His name figures with that of Upéndra, one of the most ancient epithets of Vishnu, even in the initiary formula, by which the legend expresses that an ascetic is come to the degree of an Arhat. The formula runs thus: "He becomes one of those who deserve that the Dévas with Indra and Upéndra, respect, honour and salute them."

All these divinities are those of the people, in the midst of which Sákya lives with his ascetics. They are on the part of all castes the objects of a constant and exclusive worship. Their power is not considered absolute by the Buddhists, but inferior to that of Buddha.

p. 134. The evidence adduced goes far to show the connexion of the popular deities of India with the founder of Buddhism. It is evident, that Sákya found their worship already existing. He could pronounce, and the authors of the legends believe, that a Buddha, even in this life, has a superior power even to the greatest gods, although he has not created them.

The only support, which he could find in the minds of the people, was the universal belief, that great holiness is necessarily accompanied with super-natural faculties; but this was an immense support, and gave him the means of bringing to bear in justification of his mission the belief of bygone ages; this belief, however, is not exclusively divine, in its application; the Buddha was, as all other beings, involved in the eternally moving circle of transmigration; he had traversed several existences in the bodies of animals, of condemned persons, of men and of gods, having been alternately virtuous and criminal, rewarded and punished, but accumulating gradually merits which rendered him agreeable to

the Buddhas under whom he lived, and secured him their benediction. We then observe, that in this system Sákya takes every thing from himself and from the grace of a prior Buddha, whose origin is no more divine than his own. The gods are beings of a power infinitely superior to man, but also subject to the fatal law of transmigration.

It remains to examine, first the extent and the nature of what the Buddhists have borrowed from the Bráhmans.

I quote as a single example of the results which may be expected from the study of the Sútras, that I have not found in the treatises of the Divya Avadána, the name of Krishna. The circumstance, that the name of Krishna does not occur in any of the treatises which I read, is in accordance with other signs, which show, that the religion, then existing in India, was different from that recorded in the Puranas.

The Sútras appear to me coetaneous with an epoch, when the Védas and the legends connected with them, formed the foundation of the religious belief in India. I do not support my opinion alone by the mentioning of the Védas, which is made on almost every page of the Sútras, but much more by the part which Indra, the hero of the Védas, plays in the Sútras, as he appears more frequently in the Sútras than all the other gods together.

The details given by the Sútras on the condition of Indian society at the period of Sákya's preaching, are still more numerous and important than those relating to religion.

p. 138. India was at that time subject to the reign of the castes, which were those of the Bráhmans, Ksattriyas, Váisyas, Sudras and Chándálas, not to mention some subdivisions of the inferior classes. The names of the castes are quoted every moment, and their existence is so well established, that it is admitted by Sákya himself and by his disciples, and does not become an object of special observation, unless it is made an obstacle to the preaching of the Buddha. The Bráhmans appear most frequently, and their superiority over the other castes is uncontested. They distinguish themselves by their knowledge and their love of virtue. Some, arrived at the rank of Rishis, live in the midst of woods or in the caverns of mountains. They submit themselves to severe penances, recite the Bráhminical Mantras and teach them to their disciples. Their sciences are the four Védas, and the practice of sacrifice.



Some Bráhmans are employed by the Kings as Puróhitas, or family priests, others as panegyrists to praise the Kings, for which they received presents.

The Ksatrya caste also existed at the time of Sákya, from which caste the Kings emanated.

140. The superiority of the two higher classes is generally acknowledged. They appear to have favoured the mission of Buddha ; but not so all the Kings of central India ; the King of Rajagriha persecuted him for a long time.

The Kings of the Ksatrya caste were in possession of an unlimited power, and it appears that no other obstacle was opposed to their will but the privileges of the castes. The ministers of some encouraged despotism by the most violent advices. The King of Kousala wanted money. His two ministers told him,—It is the same with a country as with grain of sesamum which does not give oil, unless pressed.

The King of Kousala gave on mere suspicion of enmity towards him, the order to cut off his brother's hands and feet. The existence and perpetuity of the castes depends, according to the Sútras, on a double condition, the one for each to marry a wife of his own caste, the other to maintain his hereditary profession.

Sákya's doctrine, which according to the Sútras is more moral than metaphysical, at least in its principle, was founded upon an opinion, which was considered as a fact, and on a hope, presented as a certitude. It is the opinion, that the visible world is in a perpetual change, that death succeeds life, and life death, that man, like every thing surrounding him, is passing through an eternal circle of transmigration, that he successively passes through all the forms of life, and that his place in the scale of living creatures depends on the merits of his acts in this world. The hope held out by Sákya, is the possibility to escape the law of transmigration, by entering into the state of Nirwáná, that is annihilation. The definitive sign of annihilation is death ; but a preliminary sign was given in this life to the man destined for this supreme deliverance ; this was the possession of an unlimited science, which gave him a clear insight into the world ; that is, gave him the knowledge of the moral and physical laws, or to say all in one word, it was the practice of the six transcendent perfections, viz. of alms, of morals, of science, of energy, of patience, and of charity. The authority, on which Sákya based his mission, was entirely personal, and consisted of two elements, the one

real, the other ideal. The first was the regularity and holiness of his conduct, of which chastity, charity, and patience form the principal characteristics, the other his pretension to be a Buddha, and as such to possess superhuman science and power. He lastly presented himself as the saviour of mankind, and promised, that his doctrine would not be annihilated by his death, but would last a long series of centuries, and that another Buddha would appear to perpetuate it, if its influence should decrease. This is according to my view the most simple and primitive form, under which Sákya's doctrine is presented. Sákya-muni presented himself in the midst of a society, thus constituted, as one of the ascetics, who since the most ancient times traversed India, preaching morality, and the more respected by society, the more they appeared to condemn it; he even entered religious life, by placing himself under the tutelage of the Bráhmans. When he had learned from his teachers all their knowledge, Sákya as all other ascetics, subjected himself to severe mortifications, and at first he did not distinguish himself from other ascetics of Bráhminical race. It is also evident, that the philosophical opinion, by which he justified his mission, was partaken of by all classes of society; all classes believed in the fatality of transmigration, the adjudgment of rewards and punishments, and at the same time in the difficulty of escaping altogether the changing condition of a relative existence. As far as this point he was in no opposition to Bráhminical society. Philosopher and moralist, he believed the greater part of the truths admitted by the Bráhmans, but he dissented from them, when the consequences deducible from these truths and the condition of salvation came into question.

The means which Sákya employed to convert the people to his doctrine, were preaching, and according to the legends, miracles. The preaching is a means, worthy of attention, and is, I believe, never heard of before the mission of Sákya.

I have already in the first portion of this work insisted upon the difference of the Buddhist instruction from that of the Bráhmans. The difference especially appears in the preaching, the effect of which was to bring home to the common understanding all the truths, which were previously the property of the privileged classes. It (the preaching) gives Buddhism a character of simplicity, and under a literary view, of mediocrity, which distinguishes it from the very profound manner of instruction of the Bráhmans. It explains, how Sákya was induced to receive into the

number of his hearers, men who were rejected by the more elevated classes of society ; it accounts for the success, with which his doctrine was propagated and his disciples multiplied ; lastly, it reveals the secret of the radical modifications which the propagation of Buddhism must produce in the Bráhmancial constitutions, and of the persecutions which apprehension of changes necessarily brought down upon the Buddhists, when they should become powerful enough to endanger a political system, principally founded on the existence and perpetuity of castes. These facts are so intimately connected with each other, that the presence of the first (viz., the admission of the hitherto excluded classes) suffices to develop gradually the others as a matter of course. But external circumstances may have favoured this development ; the mind may have been more or less well prepared ; the moral condition of India in one word may have favoured the ardour of the people to hear the instruction of Sákya. It is this, which one can learn alone from the Sútras.

I have before observed, that the second means for conversion was the splendor of his miracles. With this means always correspond the sentiments of benevolence and of belief, which are awakened within the hearers by the influence of his virtuous actions in his former existences. It is therefore a favourite theme of the legendists ; and in fact, there is not one conversion recorded, which had not been prepared by the benevolence, felt by the hearer for the Buddha and his doctrine. This virtue of the Buddha, or to name it more clearly, this kind of grace, was the great motive for conversions, which would be otherwise perfectly inexplicable, it was the knot, by which Sákya connected the new religious light introduced by his doctrine, with an unknown state of past existences which he explains in favour of his preaching. It may be easily understood, what influence such a means must have exercised upon the minds of a people, among which the belief in the law of transmigration was firmly established. In starting from this belief, upon which he founded the authority of his mission, Sákya appeared rather to explain the past than to change the present : and it cannot be doubted, that he made use of it to justify the conversions, which the prejudices of the higher castes, to which he belonged by birth, condemned. But this motive of grace is entirely religious, and it is one of those, the employment of which the legendists have undoubtedly exaggerated, and must have exaggerated, when Buddhism had afterwards acquired an import-

ance, which it certainly had not at the time of Sákya. Motives more human have probably influenced the minds, and favoured the propagation of a creed, the first steps of which looked like only one of the sects, which have been at all times so numerous in India. These motives are individual and general.

While Buddhism attracted the ignorant Bráhmans, it collected at the same time the poor and the unfortunate men of all conditions. A great and sudden misfortune was often a decisive motive to abandon the world and to become a Buddhist ascetic, so were also the despotism of the kings, and the fear inspired by their violence, and lastly, the greatness of rewards which Sákya promised to them, who embraced his doctrine.

The second class of the Nepal works, which bears the general title of Vinaya, or discipline, is represented by the Avadánas or legends. What has been before observed of the Sútras, also applies to the Avadánas. There are some among them which speak of Sákya alone and his first disciples, and these are the most ancient; there are others, which, while relating events that happened to Buddha, mention the names of persons, who lived a long time after him, as for instance, Asóka; there are, lastly, some written in verse, which must be considered as modern amplifications of more or less ancient works.

Another analogy between the Sútras and Avadánas is, that the discipline in the Avadánas is equally as far from a strictly dogmatical explanation as the ethics and metaphysics in the Sútras. The Sútras, says Mr. Burnouf, treat ethics and metaphysics not systematically, because they ascend to a remoter epoch, when those two elements of every religion had not yet obtained their full maturity, or to say it more precisely, they reproduce the various and easy style of Sákya, who did not expound, but simply preach. This is also the case with the Avadánas. The discipline has here no formal regularity, because they belong to the same period as the Sútras, and Sákya did not require the measured steps of a didactic exposition to establish a point in discipline.

To become a disciple of Buddha, it was sufficient to believe in him, and to declare to him the firm resolution to become his follower. The neophyte was then to shave his hair, to use as garb a kind of tunica and a cloak, made of yellow rags, and to place himself under the instruction of an older believer.

In the commencement of his preaching, however, when the number of his disciples was inconsiderable, Sákya instructed himself his neophytes. The investiture gave his followers the character of religious mendicants; for after the obligation to observe the law of chastity, the most binding was to live on public charity alone. From the life of privation, to which his followers had to submit, they received the title of Sramanas, or ascetics, who subdue their senses, a title which Sákya bore himself, (both these titles, mendicants and ascetics, were borrowed from the Bráhmans, who, however attached a different sense to them.)

The first of all conditions, which those who wanted to become his disciples, had to fulfil, was belief; and this being found satisfactory, all others might be dispensed with. Excluded from his assembly were persons, affected with incurable diseases (as lepers) or with gross defects of the body; criminals, as the parricide, the murderer of his mother or of an Arhat; persons who had created dissensions among the religious, or who had committed one of the four great crimes of the Bráhmans: persons under the age of 20 years, who had not the authority of their parents; slaves who might be reclaimed by their masters; debtors, who might be prosecuted for debt. No person could be admitted by a single follower, but he was to be examined and received by the whole assembly. The legends inform us, that Sákya conferred on the assembled body of the religious the office of receiving novices, and investing them when prepared, and also, that he appointed two chiefs of the assembly.

The different classes of persons, composing the assembly, of which Sákya was the chief, were as follow. First, the mendicants; to them corresponded a body of female ascetics, the admission of whom was guided by the same regulations. They had also to submit to the same obligations, enjoined by the law of discipline, viz. to the observance of perpetual chastity, and to the duty of supporting themselves by begging. These ascetics of both sexes compose the body of the assembly; a degree lower are placed the Upásakas and Upasikás, that is to say, the devotees, or more generally, the believers, who professed to believe in the truth, revealed by Sákya, without having assumed the life of an ascetic. Mr. Burnouf believes, that this institution was not introduced until after the death of Sákya. I do not think, he says, that Sákya-muni would from the commencement of his preaching have divided his assembly in Bhikhus (mendicants) and

Upasákas, (devotees) of both sexes. The external organization of Buddhism like its metaphysics, must have rather passed through numerous degrees in consolidating itself, before it attained the state in which we find it among nations, a long time converted to Buddhism. The books of Nepal even allow us to watch the progress of this organization, which commences indeed from a small germ. Sákya has first five disciples, who soon desert him, when their master, exhausted from long fasting, has broken the vow of abstinence. The number of his disciples gradually increases; kings, Bráhmans, merchants, join them to hear the word of their master. These are the Upásakas, the assistants, at a later period the true devotees.

Still the ascetics alone formed the assembly of Sákya; it is therefore called in the texts "the assembly of the mendicants." The term *San-gha* implies a double relation, first of all the religious with the Buddha, and secondly, of the religious with each other. As regards the principle, the only bond, which unites them with their master and with each other, is the common submission to his word. Having received from Sákya the knowledge of the fundamental truths and the title of ascetic, they live in all other points differently, some in the solitude of woods and mountains, others in deserted houses, others in forests near villages or towns, which they leave only to procure their subsistence by begging.

Several circumstances, related in the legends and Sútras, go far to show the commencement of this organization. While Sákya lived, it was natural, that his disciples should attach themselves to his person. Not all the religious, however, lived in solitary places, and even those who had chosen this kind of life, left it sometimes to hear the Buddha. At the approach of the rainy season the ascetics could give up the vagrant life of mendicants, and were allowed to retire to fixed abodes. Then they dispersed to reside with Bráhmans or house-holders, favourably disposed towards them, and occupied themselves with explaining the truths of their belief, or with studying and meditating on the points of their doctrine, with which they were less familiar. This was called staying during the rains (*Varsha*). When the *Varsha* expired, they again met, and formed a real religious assembly. All conspires to establish the opinion, that this usage was introduced by Sákya himself or his first disciples. This is one of the circumstances, which favoured the organization of the religious as a

regular body. One of the first results was the establishment of Viháras, or monasteries, situated in forests or gardens, where the religious assembled to assist in the preaching of their master. These Viháras, however, were at first not establishments, to which the ascetics retired for their whole life; on the contrary, they first were only places for temporary sojourn, or according to etymology, places where they sojourned, and the origin of the term is expressed in the very formula, which commences every Sútra, "At a certain time Sakya sojourned (*viharati sma*) at such or such a place." The principal destination of the Viháras, second only to their being intended as asylums for the religious, was to receive travelling ascetics and foreigners. There undoubtedly is a great distance between this almost pastoral state of Buddhism and the flourishing condition, in which Fahian found it in the fourth century A. C. in the rich Viháras and hermitages; but between both periods nearly nine centuries are intervening. However great the difference may be between these two conditions of Buddhism, it is evident, that the second must have soon resulted from the first. Indeed, the ascetics having obtained fixed abodes, their mutual connection must have become closer, and owing to this circumstance, their body have become better organized and therefore more compact than that of the Bráhminical ascetics. With this material fact there was combined the necessity of resisting the attacks of their adversaries. This made them sensible of the expediency of forming an association, which afterwards might be easily changed into a monastic institution. The religious assembly once established, a hierarchy must have soon formed itself to maintain order. Thus we see in all legends the Bhikchus taking rank according to their age and merit. In the assembly rank depended upon age, and the principal ascetics had the name of Sthavira (in Pali Thera) elders, who occupied in the assembly the first rank after Sákya. The Sthaviras were again divided into elders and elders of the elders. Merit also distinguished the ranks, and the author even thinks, that an incontestable superiority was only assigned to him, who combined merit with the privilege of seniority.

Aryas, venerable, were called those, who had comprehended the four sublime truths, the fundamental axioms of the Buddhist doctrine, viz. 1, there exists pain; 2, all that is born in this world, suffers pain; 3, it is necessary to liberate ourselves from it; and 4, knowledge alone offers the means of this deliverance. The title of Arya was one of the highest obtainable; beside the knowledge of those truths, it required the possession

of supernatural faculties, and was given to the first and most eminent disciples of the Buddha. They are not called so according to their seniority as the Sthaviras, but owe this title to their virtues, superior faculties, and the perfections, by which they are free from the common conditions of human existence. Other titles were Sróta apannas, Sakridá gámins, Anágámins, and Arhats. We cannot follow the author into the learned discussion, by which he endeavours to establish the meaning of those terms, but notice here only the result, that the first three appear to be derived from future states, promised to all believers by the word of the Buddha, while Arhat is a state, which a person can only obtain by superior knowledge, after having embraced religious life, and the consequence of which is the possession of the five supernatural faculties.

To sum up with the author. The assembly of Sákya, or what is the same, the body of the religious followers of his doctrine, was composed of Bhikchus, or mendicants, who also called themselves Sramanas, or ascetics, and among whom the seniors assumed the name of Sthaviras, or elders. The first two titles were so to say absolute denominations, while in relation to other members of Indian society, the religious named themselves Aryas, or honourable, and in relation to their master, Sravakas, or hearers. Among these latter were distinguished the Maha sravakas, or great hearers. By applying the denominations of Sróta Apanna, Sakrid Agámin and Anágámin to the believers, we must admit, that the advantages promised to those who were defined by these titles, were not withheld from the true followers, but these advantages, which could only be realized in a future life, did not constitute degrees of rank in the hierarchy. The only title of this kind is Arhat, or venerable, denoting an ascetic, superior to the other Bhikchus, on account of his knowledge and supernatural faculties, so that in fact, with the exception of synonymes and some minor varieties, just alluded to, there are only two classes of hearers, the Bhikchus and the Arhats.

A very remarkable institution, which belongs even to the time of Sákya, is that of confession. Firmly established in the most ancient legends, it is easily recognised as one of the fundamental institutions of the Buddhist faith. The fatal law of transmigration attaches reward to good actions and punishment to bad actions, it even establishes the compensation of the one by the other, by offering to the sinner the means of liberating himself from its effects by the practice of virtue.



This is the origin of expiation, which holds such prominent place in the Bráhmínical law. This theory is passed by in Buddhism, which takes it as a fact with so many other elements of Indian society; but here it assumes a particular form, by which its practical application is considerably modified. The Buddhist believes with the Bráhman, that bad actions may be compensated by good ones; but as he does not believe any more in the moral efficacy of tortures and punishments, the expiation has returned to its principle, that is to say, to the feeling of repentance, and the only form which it receives in practice, is confession.

Among the principal duties of the ascetic were the obligation to take his meal together with those who lived in the same monastery, and the commandment, never to refuse his guest any assistance he required. The latter commandment, though based on the beautiful idea of the Orientals, as regards hospitality, had taken a peculiar application with the Buddhists. By a predilection for moral sentiments, they introduced these ideas into the religious life, which they always represent as the ideal of the life of man in this world. Hence appears the real character of Buddhism as a doctrine, where the practice of morality is the supreme law, and distinguishes it from Bráhmínism, where on the one hand philosophical speculation, and on the other, mythology, occupies so conspicuous a place. Hence Buddhism also bears witness to its being posterior to Bráhmínism. If moral systems are indeed subsequent to ontological theories, which is positively proved by the history of Greek philosophy, Buddhism is necessarily, and to say so genetically, posterior to Bráhmínism.

The worship of Buddhism is most simple. A religion, says the author, without many dogmas has only a simple form of worship, and nothing in fact is simpler than that of the Buddhists. It is evident *a priori*, that Sákya attached little importance to such a form, and the Sútras give evidence, that he valued much higher the discharge of the moral duties than the practice of religious ceremonies.

The religious ceremonies consisted in offering flowers and perfumes, which was accompanied with the noise of instruments and the recital of hymns and pious prayers. There were no bloody sacrifices. The worship is in fact not addressed to One God, or to a number of divine beings, invented by the imagination of the Bráhmans; it has only two objects, the representation of the figure of Sákya-muni, and the buildings enshrining a part of his bones. An image and relics, this is the whole

worship of the Buddhists. Hence it is easily understood, why the legends are so much occupied with the physical beauty of Sákya. The Buddhists attribute, as is generally known, to the founder of their doctrine, the possession of the 32 characteristics of beauty and 80 secondary signs. The image of Buddha is not, as those of Siva or Vishnu, an exaggerated number of attributes, but simply of a man, seated in the attitude of meditation, or making the sign of preaching. This image, with the exception of inconsiderable differences, is invariably the same.

Here must, however, be considered the modifications which Buddhism underwent in the course of time. The worship indeed has not changed much; but new objects of adoration are associated with the image of Sákya. In more ancient time these must have been the statues of the four Buddhas, previously to Sákya; in more modern times the images of the five Dhyáni Buddhas and the Bódhisattwas, known from the exact drawings of Mr. Hodgson; but on the whole, the type is the same, viz. of a man who meditates and instructs.

The second objects are the relics, which have the significant name of Saríra (body.) This application of the term is entirely foreign to the language of the Bráhmans. It is the body of Sákya himself, adored in the relics. They were collected on the funeral pile, where his mortal remains were consumed, and according to the tradition, enclosed in eight cylinders of metal, over which the same number of monuments, called Cháityas, were raised. The monuments still extant in India, corroborate most satisfactorily this tradition. From Clemens of Alexandria, who speaks of the venerable sages adoring a pyramid, under which the bones of a god were entombed, to Fahian, the Chinese traveller, to General Ventura, who in our time first opened these topes, the uninterrupted tradition of seventeen centuries confirms the existence, and even the destination of these monuments.

But here we must pause, being afraid to have already trespassed upon the indulgence of the reader, and at the same time feeling unable to do justice in so short a sketch as this to the third part of the work, in which the author enters into the intricacies of the metaphysical tenets of the Buddhists, and introduces us to their various schools. We only observe, that it is full of important results, and that Mr. Burnouf by discovering in one of the MSS. the names of the Buddhist schools, as they occur in the controversial writings of the Bráhmans, has supplied the link, which appeared to be lost, between the historic philosophy of the Bráhmans and Buddhists.

In taking leave of the author with the hope, that he may soon be able to complete his important work, we conclude with expressing the wish, that it may contribute to revive the zeal for similar enquiries here in India. May it warn us that by collecting the Sanscrit and Pali MSS. from all parts of India, we may still open new sources to the learned, may it warn us, that there still are ancient architectural monuments, which are not sufficiently explored, and which may perhaps but for a short time longer, invite us to preserve the records which they have for centuries offered to the enquirer.

*On the genuine character of the Horá Sástra, as regards the use of Greek terms.* By J. MUIR, Esq., C.S.

In the "Zeitschrift für die Kunde des Morgenlandes," part 2nd, of the 4th volume, page 302, et seq. there is a translation of an article, from the translations of the Literary Society of Madras,\* by Mr. C. M. Whish, on the origin and age of the Indian Zodiac, with remarks by Mr. Lassen. Mr. Whish's paper is written to prove the derivation of the Hindu Zodiac from the Greek Astronomers, and in pursuance of this object, he quotes from a Sanskrit Astrological work, called the Horá Sástra, a verse in which the names of the different signs of the Zodiac are evidently of Greek origin. Mr. Lassen in his remarks on Mr. Whish's paper, subjoined to the translation, expresses a doubt of the Horá Sástra being a genuine work of the ancient Astronomer Varáha Mihira; and, (in the absence of the original works, to which he had not access,) refers to Mr. Colebrooke's account of that writer's works, in which no mention is made of the Horá Sástra.

Being anxious to ascertain the age and genuineness, or otherwise, of the Horá Sástra, according to the idea of the Astrological Pundits at Benares, I sent a copy of the Slokes quoted from that work in Mr. Whish's paper to Bapu Deo Sástri, (an enlightened young man, an élève of the late Mr. L. Wilkinson, and now Professor of Natural Philosophy in the Government College at Benares.†) He at once recog-

\* Part I. London 1827, pp. 63—77.

† Bapu Deo is an excellent Astronomer and Mathematician, well read in the Hindu system; and in the European, advanced as far as the Calculus, and daily adding to his knowledge. He has written a Treatise on Algebra, on the European system, in Sanskrit and Hindi.

nized the verses as being from the *Vrihat Játaka*, which is mentioned in Mr. Colebrooke's *Dissertation on the Algebra of the Hindus* (Essays, Vol. II. p. 478,) as the work of Varaha Mihira. He also brought me a printed copy of this work from the press of Madhab Ram, Calcutta, which I forward by Bhangy for the Society's inspection, though it is probably already in your Library. So far therefore as the authority of Mr. Colebrooke, (who fixes the date of Varaha Mihira at the close of the 5th or beginning of the 6th century of our Era) is conclusive; and so far as the occurrence of the sloke in question in the modern copy of the work is admitted as a proof of its having been there from the commencement; we have evidence for these Greek terms being known to the Hindu astrologers from the beginning of the 6th century.

For the satisfaction of the curious, I quote the sloke containing the Greek names, and subjoin the Greek originals as given by Mr. Lassen from Mr. Whish's paper. The names differ a good deal in Madhab Ram's printed copy from those given by Mr. Lassen.

क्रिय ताबुरि जितुम कुलीर लेय पाथेय जूक कोर्ण्याख्याः ।  
तौक्षिक आकोकेरो हृद्गेगश्चान्त्यं भं चेत्थ ॥

Sanskrit Names, as given in Madhub Ram's printed Copy.		Sanskrit Names, as given by Mr. Whish, as quoted by Lassen.		Original Greek terms, as given by Whish in Lassen.
1. Kriya,	....	Kriya,	....	ΚΡΙΟΣ.
2. Táburī,	....	Tavuru,	....	ΤΑΥΡΘΣ.
3. Jituma,	....	Juthuma,	....	ΔΓΔΥΜΟΣ.
4. Kulíra,	....	Kulíra,	....	ΚΑΡΚΙΝΟΣ.
5. Léya,	....	Léya	....	ΓΕΩΝ.
6. Pátheya,	....	Parthóná,	....	ΠΑΡΘΕΝΟΣ.
7. Júka,	....	Juka,	....	ΖΥΓΟΣ.
8. Korpya,	....	Kórpya,	....	ΣΚΟΡΠΙΟΣ.
9. Taukshika.	....	Taukshika,	....	ΤΟΞΟΤΗΣ.
10. Akókéró,	....	Akókéró,	....	ΑΙΓΟΚΕΡΩΣ.
11. Hridróga,	....	Hridoga,	....	ΥΔΡΟΧΟΟΣ.
12. Bham (a Sanskrit word apparently).	....	Ithusi,	....	ΙΧΘΥΣ.

The 4th word, Kulíra (कुलीरः) however, appears to be pure Sanskrit.

In addition to the Greek words above enumerated, the following occur in the verses quoted in Mr. Whish's paper, viz.

Heli,	ἥλιος,	The Sun.
Heman,	Ἑρμης,	Mercury.
A'ro,	Ἄρης,	Mars.
Kónó,	Κρονος,	Saturn.
A'sphujit,	Ἀφροδίτη,	Venus.
Jyók,	Ζευς,	Jupiter.

For Iyok, however, Mádhav Ram's edition reads Iyau: and Bapu Deo says it should be Ijyau, making with the preceding word (according to the rules of Sandhi, or combination of letters) *Vachasámpatiyyau*, (वचसांपतिज्यौ), being two names for Jupiter, but both pure Sanskrit.

Mr. Colebrooke, had previously pointed out the following words which occur in Hindu astrological or arithmetical works, as being of Greek origin, viz: *होरा* (Hora;) *द्रेष्काण* (dreshkána) (δεκανός;) *लिप्ता* (Liptá) (λεπτά) a minute of a degree; *केन्द्र* (Kendra) (κέντρον.) He also instances, ("on a hasty glance over the Indian treatises on horoscopes,") *anapha*, *sunapha*, *durudhara*, and *kemadruma*, words "designating certain configurations of the planets," as "not Sanskrit, but apparently barbarian," the affinity of which to terms in other languages had not been traced. (Essays, vol. 2, p. 529.) The words *anapha*, and *sunapha*, Mr. Lassen derives, with evident probability, from the Greek *ἀναφή*, and *συναφή*. And it should be observed that, though rejecting the testimony of the Horá Sástra, he holds that the use of Greek terms by the Hindu astrologers dates as far back, as Varáha Mihira. The Horá Sástra is, however, as has been shown above, identical with the *Vrihat Jataka*.

I add a list of other foreign terms, pointed out to me by the Sástri, as occurring in the Vrihat Játaka; which denote, he informs me, the different compartments of a Kundali, or square astrological figure for casting nativities. They are as follows; *रिफ* (rihpha), *दुश्चिकथ* (dushchiktha), *द्यून* (dyúna), *पणफर* Pánaphara), *आपोक्लिम* apóklima qu. *αποκλιμα*, *हिबुक* (hibuka), *जामित्र* (jámitra), *मेसूरण* (mes. húrana) qu. *μεσουράνιον*? *वेशि* (veshi.)

*Azimghur*,

Nov. 13th, 1845.

*Account of the Panjkora Valley, and of Lower and Upper Káshkár, by Rajah Khan,\* of Cabool. Translated by Major R. LEECH, C.B., Late Political Agent, Candahar, at whose request it was drawn up in 1840.*

Panjkora is inhabited by Maleezai Eesafzais, who are divided into two sub-divisions. One extending from the commencement of the valley of Panjkora to Ousheree, called Osai; the other is called Sihsadah. The chief is a Paindah-khel.

Grain is at all times eight times cheaper than at Cabool; fruits are plentiful, as are herds and flocks. There are several iron mines. Merchants from Peshawar frequent the country.

The following are the villages of Panjkora to the west of the river. Shagoolee darrah, Taimoor-galah darrah, Rabat-i-Mahammad khan darrah, Kavanee darrah, Malahkand valley, (darrah) of Tormang, valley of Karoo, Nahag darrah, Ousheeree darrah, Zarakhel darrah, Bor-Ousheeree darrah, Dral darrah.

To the east of the river, the valley of Harhang (shrine of Ghazee Sahab), valley of Shoooh, (river of Bajour falls into the Panjkora).

Baba khels, formerly under Aslam khan, now under Ghazan khan.

Valley of Maidan, valley of Panjkora, valley of Shamoorgurh, valleys of Thankee and Doodba enter this.

Barahwal, under Mahammad Alee khan, (an iron mine here).

Bar Panjkora, Ghundee Chakgatin, Arota Seen (river), Deer, Panakot, Kashkaree, Doobandai, Kheer, dependent on Deer.

These valleys have all streams. One river from Bajour, which is to the west of the Panjkora range, falls into the Panjkora river through the valley of Shoooh. The river of Panjkora runs from north to south.

*Villages of the valley of Shagoolee.* Kazrah, Shahee khels, under Zardad khan; Kotkai, Shahee khels, under Hyder khan; Gadee, Paindah khels, under Sadulla khan, brother of Ghazan khan; Haraon, Shahee khels, under Masoom khan; Shagoolee, Noor khels, under Aiyooob khan.

*Valley of Timoor-galahs.* Timoor-galah Noor khels, under Sardar

\* This man also under my instructions visited most of the Turkistan, states and gained a quantity of information regarding the Siahposh Cafers. His notes are in my possession.

khan ; Khoonkoh, Noor khels, under Mahsin and Ghafar ; Mayan Mandah, Sahabzadahs, under Mahsin and Ghafar ; Datooh, Akhund khels, Charpherah, Nasradeen khels, under Mahammad khan ; Shahr, Nasradeen khels, under Sarwar Myan.

*Valley of Rabat.* Samrai, Paindah khels, under Gul khan ; Rabat, Nasradeen khels, under Muhabat khan ; Kanjalah, Myan khels, under Agha Sahab.

*Valley of Kavnee.* Walkhah, Paindah khels, 1000 houses ; Malakhand, mixed tribes, 1000 houses.

*Valley of Tormang.* Akhqram, Painda khels, under Agad Rahman ; Doodba, Painda khels, under Sher Alee.

*Valley of Karoo.* Inhabited by Taroozais and Eesafzais.

*Valley of Nhag.* Nhag-Painda khels, under Chiragh Shah ; Wadee-Paindah khels, under Bazoo ; Jaghakinj, Gadhai khels, under Allaiyar khan ; Darooja-Sultan khels, under Sayad Ameer.

*Valley of Oosheeree.* Oosheeree Sultan khels, under Kaza Abdu Rahman ; Beebeeyawah Paindah khels, under Abdulla Khan ; Kandeekan, Myan khels, under Sayad Adam, Kakazin, Myan khel ; Jahar-Sultan khels, under Mahammad Hawefa ; Jaharalmas Paindah khels, under Zareef khan ; Tar-pitar Painda khel, under Hujoom khan.

*Bar Oosheeree Valley.* Oosheeree, Paindah khels, under Awar Shah khan ; Barkand Myan khels, Kareemdad, descendent of Akhund Darveza ; Damazar, Paindah khels, Ahmad khan ; Palam, Paindah khels, Fazal Shah ; Samkot, Paindah khels, Sher Zeman ; Batil Myan khels, Khairulla Myan ; Nashtamil, Goorkhavee, Habeebee, Paidah khels, Myan Nazeem ; Kamangar Noor khels, under Hakeeb.

*Valley of Dral.* Dependent on, and tributary to, Ghazan khan.

*Valley of Hurhang.* Desolate beyond the villages of the Zyarat.

*Valley of Shoooh.* Having villages and gardens on each bank of the Bajour river.

The Baba khels were formerly under their own chief, Aslam khan. Ten years ago, Ghazan khan subdued them.

In the valley of Maidan, is Kheemah Shahee khels, under Baroon, and many other villages. The inhabitants are more formidable than those of the other valleys.

*Valley of Panjkora.* Bar Panjkora, Sultan khels, Sher Alee ; Kooz Panjkora, Sultan khels, Pagal ; Patao, Sultan khels, Mardan.

*Valley of Shamoor Gurh.* Shamoor Gurh, Paindah khels, no chief; Geer, Paindah khels, Allaiyar khan; Amlooknar ryots, Paindah khels; Jublak ryots, Paindah khels.

Barahwal, belonging to Mahammad Alee khan, included in, but not tributary to Panjkora; an iron mine of long existence.

The following villages are marts for merchandize.

Surkhal, Loorkhal, Deer, Barahwal. The chief of this valley of Panjkora is Ghazan khan, son of Kasam khan, son of Zafar khan, son of Ghulam khan, son of Akhund Ilyas, whose descendants are distinguished from other Paindah khels, as Akhund kor, (kor-house.)

Akhund Ilyas, was a holy man who had two sons, Aooob and Ismail, he lived in the time of Aurungzebe.

Aiyooob was a domestic in the household of the governor of Cabool, and after a long period of faithful service, got leave to return to his native country, accompanied by four tradesmen, (one goldsmith, one carpenter, one huntsman and one mason.)

Mulla Ilyas told his sons, he had only one sword, and one kajkol, (vessel in which beggars receive their alms,) to bequeath them, and told them to choose; Ismail chose the kajkol, and his descendants are religious recluses and beggars; Aiyooob chose the sword, and his descendants are rulers.

Kasem khan had three sons, Azad khan, Ghazan khan, and Sadulla khan, their mothers being Eesafzai.

In the time of Shah Mahmood, Azad khan killed his father, in return for which Sadulla khan killed his brother; Ghazan khan, with the assistance of Shah Kater got the country, to this day the same friendship exists with the Chatrar nation.

This year, in the month of Muharam, the brothers had a fight, losing between them twenty-four killed and wounded.

Herds and flocks are not taxed, but three rupees a year is taken from each house.

They are friendly to the Lahore government, and exchange presents.

Just now an elephant has been sent by the Lahore government, and in return they send iron, honey, or hill horses, through Sultan Mahammad khan.

They are continually sending to Peshawar Ceskaree slaves for the governor.



From Oosheeree further to the north they have a measure called *uganee*, equal in weight to three charaks of Panjkora, (five Panjkora seers, four Cabool seers). Animals, sheep, buffaloes, &c. are plentiful and cheap.

In Koonachteer they make yellow soap of oil, where they are all oil pressers. The whole Nobistan as far as Hujkoom is supplied from this.

Panjkora is in length four stages, and in breadth one stage. There are four iron mines, and three of antimony, (white, red, and black).

From Maidan valley to the west, is the road to Bajour. From Barrahwal there is another. From Oosheeree to the east is a road to Swat; from Karoo Darrah to the east, is a road to Swat; from Timurgalah and Katgalah viâ Talesh to the south-east, is the road to Ashnaghar and Peshawar, a gun-road, the only one into Panjkora. Sultan Mahammad Khan has several times been in it.

Talash is a district of the Goosafzais included in Panjkora, but without the valley, it is very fertile, grain being often exported thence to Peshawar. There are remains of buildings like towers, in which are stones of a cubit length, on which are Greek (?) characters.

The following are the villages of Talash;—Bagh, Shaha khels, Ghulam Shah; Shamsee khan, Shaha khels, Shah Afzal khan, Gumbatee, Shaha khels, Shah Afzal khan, Amlook Darah, ryots.

Muchoo, Noor khels under Ghazan khan; Bajooroo, Noor and Shahee khels. Shah Afzal khan; Kamangar; the inhabitants are all bow-makers, whence the name.

Deer is the boundary of the snow and rain.

The river of Panjkora takes its rise at Laspoor, the commencement of the hilly country of Kashkar.

From Deer to Kashkar, viâ the Pass of Doobandai, a night is spent in the road.

Kashkar is an extensive fertile country, to the north of Panjkora, thickly inhabited by a prosperous class of people; by religion, Sunnee Mahommadans: their nation is called *Chatrar*.

There are two Kashkars, upper and lower; the lower was under Shah Kator; the upper under Malik Aman formerly; they are now dead, and have been succeeded by their sons, who rule together. They are independent, having their subjects under such subjection as to sell them like animals.

Wheat and rice are plentifully produced. The men dress in two or three choghas of the kind sold in Cabool, and the women dress in a loose garb like the women of Cashmeer.

There are two sons of Shah Kator, one named Mehtar, and the other Tajamal Shah, who is the ruler. The revenue is not fixed,  $\frac{1}{5}$   $\frac{1}{4}$  and  $\frac{1}{2}$  is taken in kind. They do not take ready money, but barter for Peshawar goods.

Slaves are cheaper at Kashkar than any where else, viz. 100 rupees each (a girl or a boy.) 200 or 300 are yearly exported viâ Dardu and Badakhshan to Turkistan.

The following are the principal towns of Lower Kashkar.

Laspoor, to the east; Daroosh to the north; Dral Pooreet, to the north; Daroosh to the south; Ashreet; Ashreet, to the north; Pooreet to the east; Daroosh; Daroosh is situated in the centre of Kashkar.

Bedlooree, to the north; Daroosh, to the south; Hujkoom; Daroosh is the capital of Shah Kator, on the east of the river of Kashkar, on a slight eminence, containing 2000 houses of stone and mud. There is a wooden bridge across the river; most of the villages are to the north, east and west.

Every one within four kos is obliged to have his case settled by the ruler.

The Kashkar language approaches to the Persian. The imports to Kashkar, are salt, which is very valuable, Peshawar cloths, and cheap chintz and pedlary. Iron from Panjkora, goor, medicines, matchlocks, swords, and copper utensils.

The exports from Kashkar are raw silk to Turkistan, known in Cabool as Karah Kashkaree; and Shalakees from two rupees to twenty rupees the piece.

The finest silk is called Poodpat, and the coarsest Narinjpood, and wool choghas from one rupee to twenty rupees, the sleeves of which are larger than the arms, and when on the sleeves are creased.

The slaves are very handsome. They use measures and not weights. They amount to 12,000 matchlockmen, (the matchlocks having a fork rest) and notwithstanding the scarcity of powder and lead, are excellent marksmen.

Ten thousand Kamosz Cafers who are situated to the north of Katar and Kampar, pay tribute to Shah Kator; they are very obedient subjects, and, unlike other Kohistanees, they do not rob.

Upper Kashkar under Malik Aman, is called Shighnan. The people are Sheeah Musulmans, who know nothing of their sect, beyond the name. They pray and fast with the Sunnees of lower Kashkar.

The horses are better than in the country of Shah Kator.

The principal places of Shighnan are Mastooj, the capital of Gouhar Aman Padshah, formerly; now under the son of Malik Aman; to the south is Daroosh; to the east Hujkoom; to the south of which is Shootee.

From Daroosh, viâ the Pass of Soori to Mastooj, two nights are spent on the road, infested by Cafers in the summer. The road is a gun-one. Guns can go throughout the country of both Kashkars beyond Daroosh, but up to that the road is difficult for laden horses.

Shighit to the north, and Shighnan to the east, are included in Kashkar, but under a separate rule.

From Shighnan to Shighit are five stages. The Cooner river passes to the west of Mastooj, and takes its rise in the lake of Neel. Beyond Mastooj, water runs to the north.

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*On the Assam Petroleum Beds (in a letter to Major JENKINS, communicated by him.) By Capt. P. S. HANNAY.*

Mr. Piddington having supplied me with a specimen of Asphalte rock from Pyremont, I have taken some trouble in trying to find something of the kind amongst the numerous coal strata and bituminous springs which abound in the neighbourhood of this place, but as yet have not been successful in finding a calcareous Asphalte, which the specimen furnished appears to be, and this may be accounted for, probably, by the absence of anything like a pure limestone rock, existing with the carboniferous strata which is visible.

I have however the pleasure to send you a few specimens of the earthy Asphalte and indurated sandy Asphalte, found in and lying over the Petroleum beds, near a spot which I dare say you recollect as

Nahore Doong, an old Salt Well, situated about two miles from this, on the road to the Naga hills.

About 200 yards on the Jeypore side of this old Salt spring, the road crosses a vein of coal, of considerable thickness, accompanied by several beds of soft sandstone. This road is merely a ravine, which like many others, intersect the low hills here, in different directions, so as to give them the appearance of being distant from the more regular forms of the low range, which rise suddenly from the plain; in fact, many are quite detached, and rise in knolls of some 50 feet high, surrounded on every side by a natural ravine, in which coal, various soft rocks, shells and clays, usually associated with the former substance are seen on regular strata, and also detached pieces of fossil wood, clay iron ore, and exceedingly hard quartz rock. This kind of ground extends for about a mile E. and N. of the coal first mentioned, and I believe there are few ravines in which there is not an appearance of Petroleum, either exuding from under a mass of limestone on a level with the bed of the ravine, or at some height up the slope of the hillocks.

From this locality, or rather at two spots where, from the quantity of Petroleum visible on the surface, they are designated Tel Doong, (or Oil-springs) I have taken the specimens now sent, but you must recollect that these are taken from the mere surface, and it is quite possible that a more interesting and valuable formation of the same kind might be found at some depth, particularly as regards the connection of calcareous matter with that from which the Petroleum is thrown up. I mention this, because, from the appearance of the specimens of blue limestone found in the bed of the Dehing River, under the water (it being evident that this river cuts through the whole of the strata before-mentioned) it might be possible to find at the depth of the Dehing bed, inland, a purer limestone than that which is on the surface. However it may be as well to say, that the different strata appear to bend Eastward, and dip to the South towards the high range of Naga mountains, in the lower portions of which there are numerous salt springs, the prevailing rock there being *clay slate*. Nothing like mountain limestone is to be seen, as far as my travels extend, on the Assam side of these mountains: and I have an idea that without some extensive formation of this kind in contact with our carboniferous strata or bitumen springs, we shall fail to find a calcareous

Asphalte like that of Pyremont. Our coal is, I believe, considered to be that of the higher series of secondary rocks, if then we could find bitumen springs at the foot of the high range on N. B. of the Burrampooter, possibly a rock of the description would be found, but this is a question for Geologists to determine.

Jeypore is not the only Petroleum locality in Upper Assam ; Borhath, Teroogong, Magawn, Namdeng and Namtchuk Pathar are noted for their earth oil springs. These are all situated in the low range of hills forming the base of that vast range of mountains which, bounding the Kyndwar valley on the West, would appear to run down to Cape Negrais. The first locality to the Westward is close to the Dekho River, south-east of Seeksagur ; but it is said that amongst the Nagas on the Western branch of this river, salt wells do not exist :\* on the Eastern branch of the river, however, there are many salt wells, and near the source of this branch, in about Lat.  $26^{\circ} 20'$  the mountain range above-mentioned separates from the more western Naga ranges which run towards Cachar. The great Salt, Coal, and Petroleum deposits seem therefore to commence with the east branch of the Dekho, and continued east as far as the Namtchuk river. At Namtchuk Pathar, near the mouth of the river, the Petroleum exudes from the banks, and a bed of very fine coking coal runs across the bed of the Namtchuk. The hills here are also intersected by ravines, and in one spot an extensive basin or hollow is formed at some height, which contains muddy pools in a constant state of activity, throwing out, with more or less force, white mud mixed with Petroleum. This is indeed a strange looking place, and I am told by the Singphos that at times there is an internal noise as of distant thunder, when it bursts forth suddenly, with a loud report, and then for a time subsides. Whether this may be the effect of distillation going on in consequence of the great mass of vegetable matter which lies under the surface, or from some more remote cause connected with volcanic action, it is impossible for me to give an opinion ; but from the connection of the Potkae with the Arracan range of mountains, the known existence of mud pools like these, in that

\* This is a mistake, there are salt springs on the banks of the Nambar and Dhunsiri rivers, and it is supposed there are many more, but the Nagas West of the Dekho do not make salt, except at Semkur in very small quantities. By their traffic in cotton they obtain salt perhaps cheaper than they could make it.

Province, and the fact, that the motions of our earthquakes are generally from south to north, I have often thought that during an active state of some of the volcanoes in the Gulf of Martaban, they might affect us here.

The Tel Doongs, or Oil-springs, and probably containing salt, are the resort of the wild animals of the forest, who eat the mud, particularly elephants, buffaloes and deer, and securely placed on a Michong, formed in one of the largest trees overlooking these pools, the Shikarrees of this frontier silently await, in the moonlight nights, the visits of these animals, and with a poisoned arrow fired from a musquet, shoot the largest elephants, which are afterwards tracked down probably for days. If the animal has a fine pair of tusks, the price of these amply repays the trouble and privations suffered in obtaining them;—most of the ivory of the Singpho country is obtained in this manner. The springs in this neighbourhood afford good sport to the Shikarrees of the corps, and many a load of Saumer Deer flesh comes into cantonments, the result of a night's watch at, or an early morning visit to, the Tel Doongs.

No. 1 Basket, contains specimens of soft rock through which the Petroleum rises: the whole mass of substance seems to be impregnated with it; the soil however, is sometimes by itself in fissures and seams, running out as these are cut open. The Nodules are found embedded in regular veins intersecting the soft rock, and more or less oil is found mixed up with them. I have not dug deeper than ten feet into the bed.

No. 2, contains the Earthy Asphalte which is found in considerable quantity, where the Petroleum oozes out, and also adhering to the soft sandstone rock impregnated with, and laying in, the Petroleum bed.

No. 3, contains the indurated sandy Asphalte rock, which I found overlying the spot where Petroleum exudes from under the low hills, of which it is in fact a portion, more or less of the red clayey soil being also impregnated with the bitumen; and the distinguishing feature of the soil of the hills in the Petroleum vicinity, is a peculiar dryness, however wet the weather may be. The soil bears a thick tree jungle, principally of a species of oak, the *acorn*-fruited Hingoree of these parts. None of the specimens shew the presence of lime, but a hard rock, which effervesces slightly with acid, does not slake when burnt, and flies into splinters when heated, passes through the Petroleum bed; specimens of this limestone I sent to you some years ago, calcined and

pounded. It would, I think, make a cement similar to Parker's, or the Roman cement.

No. 4, contains specimens of a conglomerate containing lime, forming a conspicuous rock a mile from this, directly on the edge of the river on both sides. In connection with this, indeed in some places adhering to its lower surface, as well as in the bed of the river itself at the same place, is the blue rock containing lime; from the quantity of pure carbonate of lime adhering to the surface of one of the pieces, we might reasonably suppose that a rock even purer than the specimens now sent, does exist in the same place; but the depth of the water will, I am afraid, effectually prevent its being worked; what is found of this blue rock however, when burnt carefully, slakes into a very good buff coloured lime, quite fit for building purposes. The conglomerate when burnt, partially slakes, and, when pounded up, forms a very strong cement, well adapted for flooring or roofs, or lining of water tanks, &c. Accompanying these specimens, I have sent a sample of a mixture of Asphalte earth, and pounded unburnt conglomerate fused with a small quantity of the mikai tree rosin, also a few pieces of the clay and ore of the soil of the *hills* of the Petroleum locality: there appears to be too much earth in it; as another trial I have made by covering the top of my boat, has succeeded very well, I do not see why we could not use the earthy Asphalte with success, in covering matting or plank roofs of boats or houses; it deserves a trial certainly.

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*Remarks upon the occurrence of Granite in the bed of the Narbudda.*

*By Capt. J. ABBOTT, B. A. Late Principal Assistant Commissioner, Nimarr.*

In a report upon the Mhahlie Cotton of Nimarr, which I prepared about two years ago, and which, I believe, reached the Asiatic Society, I stated, that the trap stratum of Malwa was not penetrated to its base, even by the river Narbudda, which has mined its bed 1600 feet below the table summit of the Vindhécias.

Some weeks after the despatch of this report, I visited an island of the Narbudda, opposite Mundlaisir, in order to inspect a block of grey granite, which I supposed had been accidentally deposited there.

I found, however, that this mass was in reality the pinnacle of a substratum of granite, which had there, and in several other places, pierced the trap rock; and upon attentive examination of the adjacent strata, there appeared a transition from the close, compact and uniform texture of the black trap to the granulated crystals of the granite. That is, the trap gradually assumed a less homogeneous character, separated into particles slightly blended together, and then into the distinct crystals, characteristic of granite; one stratum being the common grey kind, another the red, and a third the porphyritic, all forming with the horizon angles exceeding, I think,  $75^{\circ}$ . It was my intention to have selected and sent specimens of each transition; but heavy duties, and my subsequent removal from the spot prevented me. Should the Society be curious to see such, I can write to Col. Outram, my successor at Mundlaisir, and beg him to forward specimens.

The fact seems to me of some interest, if only as exhibiting the thickness of the trap and amygdaloidal strata of Malwa, which may thus be plausibly calculated at 1600 feet. The whole scarp of the Vindhécia, forming the Southern limit of the province of Malwa, exhibits an abruptness which savors of disruption of surface, by the elevation of the table land, or the sudden subsidence of the valley of Nimarr. Yet I have never heard of granite occurring in any portion of the section of strata presented by these precipices. A stricter examination of the strata is perhaps requisite to throw light upon the subject.

If in all cases of the appearance of granite immediately beneath trap, the two formations blend their distinctive characters on contact, it might, with some shew of reason, be assumed, that both have been in a state of fusion at one and the same time; and the more complete crystallization of the granite might be referred to the greater pressure under which it parted with its caloric.



*Further Notes respecting the late CSOMA DE KÖRÖS. By Lieut. Colonel  
LLOYD, and A. CAMPBELL, Esq. Superintendent at Darjeeling.*

[The following letters have been kept back from publication owing to circumstances, which need not special detail. I should observe with reference to Lieut. Colonel Lloyd's remark as to the absence of any notice of the deceased scholar's literary labours in the Journal, that No. 124, contains a notice of his personal and literary habits, embodied in a Report as to his death, from Mr. Campbell, with remarks appended by myself. I mention this for the facility of reference.]



With reference to the resolution of the Asiatic Society to place Rs. 1000 at my disposal, for the erection of a monument over the grave of the late Mr. Csoma de Körös, I have the honor to state, that in consideration of the necessary delay and difficulty in procuring a suitable marble monument from Calcutta, I have had a plain pillar of substantial masonry erected to mark the spot, and I purpose placing a simple tablet of stone in the pillar, with the date of his death, his name, and age only, inscribed thereon. This, however, is not wholly the manner in which I wish to see the Society's intentions fulfilled; I am anxious that a marble monument, with a suitable inscription to commemorate the deceased, shall be placed in the Church at Darjeeling, and to enable me to do so for the Society, if the proposal is approved, I request to be furnished with the inscription which the Society may consider the most appropriate.

Since the death of de Körös, I have not ceased to hope, that some member of the Society would furnish a connected account of his career in the East. It is now more than a year and a half since we lost him, yet we are without any such record in the Journal of the Society to shew, that his labours were valuable to the literary association he so earnestly studied to assist in its most important objects, as well as to shew that his labours have been duly appreciated. I know that I am not qualified by knowledge of the language and literature of Thibet, to do justice to the subject, and I have not on that account attempted it; but in the belief that the Society will be better pleased to have an incomplete notice of his labours, than be altogether without one, I have compiled a note of his published contributions to the Asiatic Society on the language and literature of Thibet, which is hereunto annexed. I have also the pleasure to forward a copy of a Biographical sketch of the

deceased by himself, which appeared in the Journal of the Royal Asiatic Society many years ago, and which was corrected by the subject of it before his death. The number of the Journal containing the sketch, with the author's manuscript corrections, is now in my possession, and was, with the Journal of the Asiatic Society of Bengal, made over to me, according to the intentions of the deceased, as expressed previous to his illness.

Further, I have the pleasure to forward copy of a summary report of the contents of the Thibetan works in the possession of the deceased in A. D. 1825, which I cannot find has been published. It was forwarded to me by Lieutenant Robinson of Sirsa, in the belief, that as the work of de Körös it would be acceptable to me. If it has not hitherto been published, it will be an interesting addition to the contributions of the author.\* At the time it was written, the European world was almost altogether ignorant of the subject on which it treats; and the author himself had then but a faint glimmering of the light he afterwards shed on it. To admire the zeal, and laborious perseverance, by which he advanced in the ability to interpret the works he then so briefly reported on, and to compare the later elucidations of Thibetan works by the same pen with this his first essay in that line, will be a gratifying task to the admirers of his attainments, and an useful incentive to those who, in the commencement of a laborious study, may doubt their powers of advancing in it to renown and eminence.

From the date of the Biographical sketch (1825) until his death on the 11th of April, 1842, the particulars of the life of Csoma de Körös, are not fully known to me. I believe that he visited Western Thibet from Soobathoo in A. D. 1826, and that he continued to study at the monasteries in that country, living in the poorest possible manner until A. D. 1831, in October, of which year, I met him at Captain Kennedy's house, at Simla. He was then dressed exactly as when I saw him on his arrival at Darjeeling, in March 1842, in a coarse blue cloth loose gown extending to his heels, and a small cloth cap of the same materials, he wore a grizzly beard, shunned the society of Europeans, and passed his whole time in study.

In May 1832, he went to Calcutta, where he lived in the Asiatic Society's Rooms, and had charge of the library until the beginning of

\* Forwarded to the Asiatic Society, in December, 1843.

1836, when his anxiety to visit Lassa, induced him to leave Calcutta for Titalya, in the hope of accomplishing his design, through Bootan, Sikim, or Nipal. Colonel Lloyd, at that time on the Sikim Frontier, has furnished me with the following particulars of the deceased, while at Titalya, and its neighbourhood.

Csoma de Körös, or more correctly, Alexander Csoma (as well as I recollect, without reference to papers which are sent away) came up to me in the beginning of 1836, say January, but it can be easily ascertained, when he quitted the apartments he had in the Asiatic Society's house. He wished to study Bengalee, and I sent him to Julpiegoree, where he remained about three months, and being dissatisfied there, returned to Titalya, I think in March; he would not remain in my house, as he thought his eating and living with me would cause him to be deprived of the familiarity and society of the natives, with whom it was his wish to be colloquially intimate, and, I therefore got him a common native hut, and made as comfortable as I could for him, but still he seemed to me to be miserably off; I also got him a servant, to whom he paid three or four rupees a month, and his living did not cost him more than four more. He did not quit Titalya, I think, till the end of 1837, November, and all the time he was there was absorbed in the study of Sanscrit, Maharratta, and the Bengally languages. I think it was in November that he left, purposing to go to Calcutta first, but ultimately he seemed to intend getting into the Ducan; at one time he was intending to travel through the mountains to Cathmandoo, and I am not certain whether he did not apply to Mr. Hodgson for a pass, but he seemed to have a great dread of trusting himself into Thibet, for, I repeatedly urged him to try to reach H'Lassa through Sikim, and he always said such an attempt could only be made at the risk of his life. I am therefore surprised at his after all coming here apparently with that intention, yet he seemed anxious to go to two monasteries in particular, where he said there were large libraries, and one where one or both the large works, the Kagzur and Sangzur, are, he said, printed. I suppose you to be writing something regarding him, therefore I send you the foregoing, which is all I can recollect just now, though could I refer to my papers, I might have been able to say more.

Yours truly,

12th December, 1843.

(Signed) G. W. A. LLOYD.

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I recollect, that Mr. Hodgson had some correspondence with Csoma de Körös during the stay of the latter at Titalya, the subject of which was the possibility of his getting into Thibet, through Nipal; so far as my memory serves me, Mr. Hodgson invited him to come to Cathmandu, but did not give him any hope of being able to penetrate into Thibet, from that city. At that time the deceased was employed in the study of Sanscrit, which he continued with unabated perseverance until his death. When here he told me, that he had lost much valuable time from not having studied the Sanscrit previous to the Thibetan language, the former he said was the key to the whole literature of Thibet. It was on his then knowledge of Sanscrit, that he based enthusiastic hopes of realising the objects of his research. Could he reach Lassa, he felt that the Sanscrit would have quickly enabled him to master the contents of its libraries, and in them he believed was to be found all that was wanting to give him the real history of the Huns, in their original condition and migrations, and to him this was the completion of knowledge, as it was the star that led him on his untiring way of thought and study for 24 years.

In 1838, M. Csoma de Körös was asked by Captain Pemberton to accompany him on his mission to Bootan, but as this did not give him any prospect of reaching Thibet, he declined the invitation, and remained in Calcutta until the beginning of 1842, when he left it for Darjeeling. The power of acquiring languages was the extraordinary talent of M. Csoma de Körös. He had studied the following ancient and modern tongues, and was a proficient in many of them,—Hebrew, Arabic, Sanscrit, Pushtoo, Greek, Latin, Slavonic, German, English, Turkish, Persian, French, Russian, Thibetan, with the addition of Hindoostani, Mahratta, and Bengali. His library at his death had a dictionary of each of the languages he was acquainted with, and on all were his manuscript annotations.

I have, &c.

*Darjeeling, December 12th, 1843.*

(Signed) A. CAMPBELL.

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*Catalogue of contributions to the Asiatic Society of Bengal on the language, literature, &c., of Thibet, by the late MR. ALEXANDER CSOMA DE KÖRÖS.*

1. Geographical notice of Thibet, published in vol. 1, of the Journal of the Asiatic Society of Bengal, No. 4, 1832, Page 122.

2. Translation of a Thibetan Fragment, with remarks by H. H. Wilson, vol. 1, Journal of the Asiatic Society of Bengal, No. 7, July 1832, p. 269.
  3. Note on the Kāla Chakea, and Adi-Buddha Systems, vol. 2, Journal Asiatic Society of Bengal, No. 14, February 1833, p. 57.
  4. Translation of a Thibetan Passport, dated A. D. 1688, vol. 2, Journal Asiatic Society of Bengal, p. 201.
  5. Original of the Shakya Race, translated from the (La) or the 26th volume of the *MDo* class in the Ka-gyur, commencing on the 161st leaf, vol. 2, Journal Asiatic Society of Bengal, p. 385.
  6. Mode of expressing Numerals in the Thibetan language, vol. 3, Journal Asiatic Society, p. 6.
  7. Extracts from Thibetan works, translated by M. Alex. Csoma de Körös, vol. 3, Journal Asiatic Society of Bengal, p. 57.
  8. Grammar and Dictionary of the Thibetan language in two vols. printed at the expense of the British India Government under the direction of the Asiatic Society of Bengal, aided by the immediate Superintendence of the author, Baptist Mission Press, Calcutta 1834.
  9. Interpretation of the Thibetan inscription on a Bholau Bunner taken in Assam, vol. 5, Journal Asiatic Society of Bengal, p. 264.
  10. Translation of the Motto on the margin of one of the white satin scarfs of the Thibetan Priests, vol. 5, Journal Asiatic Society of Bengal, p. 383.
  11. Notices on the different systems of Buddhism, extracted from the Thibetan Authorities, vol. 7, Journal Asiatic Society of Bengal, p. 142.
  12. Enumeration of Historical and Grammatical works to be met with in Thibet, vol. 7, Journal Asiatic Society of Bengal, p. 147.
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*Narrative of a tour over that part of the Naga Hills lying between the Diko and Dyang river, in a letter from CAPT. BRODIE, P. A. Commissioner to MAJOR JENKINS, Commissioner of Assam. Communicated from the Foreign Department.*

I left Sibsagur on the 26th of January, accompanied by Mr. J. Bedford, Sub-Assistant, and Mr. J. W. Masters, late Superintendent of the Assam Company, with an escort of the strength noted in the margin,

1 Subadar,	furnished by the Officer Commanding the Assam
1 Jemadar,	Light Infantry Battalion. We encamped at Mit-
4 Havildars,	tenswa, a small village near the foot of the hills the
4 Naicks,	same evening.
1 Bugler,	
60 Sepoys.	

Leaving Mittenswa about 9 o'clock the next morning, we reached our encampment under the village of Namsang at 3 P. M.; the road is tolerably good, and the ascent easy, till towards the latter end of the march. Two long steep ascents, called by the Nagas Horoo Lejoo and Bar Lejoo, are then met with; on the top of the latter we encamped, the village of Namsang being about quarter of a mile off, and from 300 to 400 feet above us.

On the 28th, the Seema Rajah came in with about 400 followers; at the interview I had with him, he requested permission for his dependents to come down to the plains to trade. This was arranged, the Jattoong Chiefs consenting to their coming through the Matnug Mar-nug, one of their passes.

Seema lies between Jaktoong and Mooloong, and has fourteen villages tributary to it. The names given of them as are follows: Lenga, Seeyong, Taya, Juitaks, Burgaon, Chinkam, Singpho Jangha, Singlung, Lungwa, Sunjee, Haching, Kamling, Tingko. The Chief stated that he had no feud at present, and readily entered into engagements to abstain from warfare.

On the departure of the Seema Chiefs, I had an interview with those of Jaktoong. You will recollect that on one of these named Hoang Gohein, a fine had been imposed in consequence of a murder that had been committed in the plains by one of his sons. The Chief apologized for not having come down the preceding year, which he said was caused by the small pox raging violently in his village; he alleged his inability to

See my letter No. 7, of the 9th April 1842.

pay the fine in money, and presenting a buffalo in lieu, begged he might be released from annual payment.

I am of opinion that the fine can be realized, but it might be necessary to use force to effect this; and as the expence attending the employment of troops, would far exceed the value of any thing to be realized, Government may deem it advisable to remit further payment. Before the time this fine was imposed, there had been frequent incursions on the plains by the Nagas in this direction, but for the last three years nothing of the kind has occurred; and though no absolute confidence can be placed on such vile people as the Nagas, I have very great hopes that they will keep from disturbing the peace on the plains.

There are three modes of dealing with the fine. 1st—To realize it; using force, if necessary. 2d—To let it remain in force, realizing it if possible without force—and, 3rdly, to remit it altogether; and I should wish to be favored with the views of Government as to which of these courses should be followed. Should Government be pleased to remit the fine, it might be done on the ground of subsequent good behaviour, and the ready compliance with the request made for a passage for the Seema Nagas.

On the morning of the 29th we proceeded to Naugta; there had been rain in the night, and the road was very slippery in consequence; it passes through the village of Namsang, and from thence by a rapid and steep descent to the Diko. After winding up the left bank of this river for a short distance, we entered a narrow, stony nullah, called Hoodaee Jan, up which we went for about a mile and a half, and then had a very fatiguing ascent all the way to Nangta. This, for a Naga village, is a very small one, and is one of the few met with, that have no defences. The Tangsa and other tribes are reported to have destroyed it many years ago, since which the bulk of the former inhabitants have settled in other villages; those who remain appear to have thrown themselves entirely on the mercy of their more powerful neighbours, and they apparently enjoy a security for life and property beyond that of any other tribe.

Before leaving Namsang, I had an interview with the Tubloong Rajah, who had arrived late on the preceding evening. On reference to my letter No. 7, of the 9th of April 1842, para. 5th, you will observe, that I met this Chief on my former tour. Our communication on the

present occasion was much the same as before ; he is extremely anxious to get possession of the land and beels he formerly held : the land is now I believe either out of cultivation or in the occupation of other parties, and the Berhampooter has carried away one of the beels, and the others have been filled up. It is not easy therefore to restore exactly what he asks for, but an equivalent might be given him in a grant of 30 or 40 poorahs of land rent free, in the Government Jykhumdang Khat, and of one or other of the beels lying between the Diko and the Desang, near where his own beels were situated. The circumstances under which the Chief lost his possessions in the plains, as detailed in the paragraph to which I have alluded, though giving him no right to compensation from the British Government, are such as call for a liberal consideration of his claim, and I would recommend its being complied with, as the most likely means of securing the attachment of a Chief whose influence is very considerable among the tribes in this direction, and who we expect to become estranged if it be refused : should it be deemed expedient to make the grant, its continuance after the present Chief's death might be subject to review whenever that event takes place.

On the 30th we marched to Kam Sing, a large and well stockaded village, commanding a fine view of the surrounding country ; the Chief is one of the best disposed we met with, and we received from him here, and afterwards, as much assistance as he could give us. The journey occupied us about three hours, the road being for the most part tolerably level, with a few gentle slopes.

On the 31st we halted, to enable me to adjust, as far as I could, some feuds that were here brought to notice. The Kam Sing Chief has a feud with the Yungya Abors ; but though I made every effort to get the Chiefs of this tribe brought in, I was unsuccessful : they are however on good terms with the Tubloong Chief, and I am not without hopes that I shall be able to get them to come down to the plains through his influence. He sent his nephew over, who brought in a few Yungya pynes, but they came invested with no authority from the community, and could give no account of the feuds of their clans.

The Tangsa Abors were brought over by the Kam Sing Chief ; these Abors have been at war with the Namsang Nagas. The origin of the feud was represented by both parties as follows : Some years ago, a



runaway Naga from Tangsa went to live in Namsang, and after having been kindly treated there for some time, he was turned out as a thief, and went back to his own village ; some articles which it was alleged he had stolen, were demanded by the Namsang Chief, and on the Tangsa Chief refusing to deliver them up, his village was attacked by the Namsang Chief, who was beaten back, losing one of his followers. The dispute was adjusted by the Tangsa Chief delivering to the Chief of Namsang, a war dress, sword, shield and spear.

The Namsang Nagas had also a quarrel with the Nagas of Nowgong. It arose in a claim for tribute alleged to be due from Nowgong to Namsang ; the two tribes had long been at war, and numbers have been cut up on either side. On one occasion when the Nowgong Nagas had suffered severely, they made some presents to the Namsang Chief, which it was alleged by the former were given to put an end to the feud at that particular time. The other party maintained, that it was a tribute to be paid annually. The Namsang Chief now waived his claim on the Nowgong Chief, swearing publicly on a sword, that he had never promised to make an annual payment.

These arrangements were made on the morning of the 1st February, after which we proceeded to Nowgong. The road was very similar to what we passed over in our last march, and the distance travelled much the same. Nowgong is strongly stockaded, and set with panjees ; it, like Kam Sing, commands a fine view of the surrounding country ; the population is large, and the houses compactly situated ; and judging from the clothing of the people, the ornaments of the women and children, their pigs, poultry and cattle, it may be looked upon as one of the richest villages in the hills ; water is scarce here, and was so at our two last halting places.

On the 2nd we marched to Larayun, a village about as large as Nowgong, with the same kind of defences. The march occupied about four hours ; the road is not so level as in the two last marches, but it is tolerably good ; it has an easy descent to about midway, and then rises gradually to Larayun.

Larayun is at war with the Chinko or Peugaho Abors, who live on the opposite side of the Diko ; I was anxious to adjust this, but could get no communication made to the latter tribe. They are said to hold no intercourse with any of our Boree Nagas, and none of our Kotokees know

any thing of them. I understand that the only chance of communicating with them, would be through the Yungya tribe, if we succeed in getting them to come in.

On the 3rd and 4th we were halted, to get up supplies from the plains. On the the 4th we went out to Santung, a very large and populous village, about two miles from our encampment, in a south-westerly direction; both Santung and Larayun are on the ridge which separates the Diko from the Jazee; and from the former there is a magnificent view of the gorge of the Diko, which here flows down directly from the southward. While at Larayun, I received its Chiefs, and the Chiefs of Santoong and Akocca, who entered into the usual engagements; there was abundance of water from a rivulet on the Santung road.

On the 5th we had a very long and fatiguing march to the Jazee; for the first one and a half mile, we retraced our steps on the Now-gong road, and then turned westerly, descending rapidly by a narrow, steep, slippery path, which brought us to a rocky nullah, called the Seemuk; we followed the bed of this, till its junction with the Jazee, where we encamped. This march occupied us nearly nine hours.

On the 6th we proceeded down the bed of the Jazee for some little distance, crossing and re-crossing it several times. After leaving the river, we ascended by a very narrow path, with high reed jungle on both sides. As we approached Diko Hymoong, the road became wider, and it was very good in the immediate neighbourhood of the village. We had intended to encamp here, but there was a difficulty in finding a sufficiency of water, and we proceeded on towards Boora Hymoong. The road between the two Hymoongs is tolerably level and open. Huts were ready for us under Boora Hymoong, at about half a mile north of the village; the water we were able to get here, was very scanty, and had to be brought from a considerable distance.

Both the Hymoongs stand on precipitous hills, and are well stockaded. Boora Hymoong has a feud with the Ooma Nagas, an Abor tribe, with whom I was unable to communicate, or to ascertain accurately in what direction they lie. The cause of the feud, as represented by the Chief of Boora Hymoong, is as follows: the Loongtaee and Campoongya Nagas, were formerly at war; the Ooma Nagas joined the former tribe, and came to Boora Hymoong to make an attack on Campoongya; they quarrelled in drink; and numbers were then, and afterwards, cut up

on either side. During the late rule of Rajah Poorunder Sing, the Ooma Nagas surrounded Boora Hymoong, and threatened it with destruction, when the whole village turned out, and the Ooma tribe were defeated with great slaughter, though they are said to have had far superior numbers.

Diko Hymoong has a feud with the Karee Nagas, but it does not appear that there has been any recent fighting. I endeavoured, but without success, to persuade the Chiefs to go on with me to the next Dwar, where I expected to meet the Karee Chiefs. They agreed, however, to abstain from war, as did also the Karee Chiefs, when I met them a few days afterwards at Kolabaria.

At Boora Hymoong, I met the Oormoong Chiefs; they informed me that they had no feuds, and willingly entered into the engagements required of them. We heard here too, that the Sorsoo Chiefs had been at Nowgong in the expectation of meeting me there; they are said to be a numerous tribe, who cultivate cotton largely. Cotton is cultivated to some extent by all the Nagas in this direction, and to the westward, but we saw scarcely any traces of it in the route we went.

On the 9th we marched to Asringiya; we first descended for about an hour by a narrow, precipitous path, to a stream called the Teeroo, which falls into the Jazee; after crossing this, we began to ascend, and another hour and a half brought us to Laso, and in as much more, we reached Asringiya; the road between the two latter villages is good, and tolerably level. They and Campoongiya, are nearer to the plains than any Naga village we met with.

At Asringiya, besides the Chiefs of that village, we met those of Laso, Booragoon, Campoongiya and Moon Sing, who all entered into the engagements required of them.

On the 10th we moved to Kolabaria, which we reached in about  $2\frac{1}{2}$  hours, having passed through the village of Nowgong, about midway. For the most part the road is good, with no very steep ascents or descents; in some places it is narrow, with heavy reed jungle overhanging it. On our arrival we were told that there was no good water to be had, but after searching for about an hour, we found a very nice stream, and encamped on it in some ground that had been cleared for cultivation.

After meeting the Kolabaria and Karee Chiefs, and taking agreements from them, we moved on the 11th to Samsa, reaching it in about 3 hours: this is a considerable village, standing on the ridge which separates the Jazee and the Deesae. Passing through the village, we descended rapidly, and in about an hour reached the huts that had been erected for us on the Sohopanee, a pretty large stream, flowing into the Deesae. The road from Kolabaria to Samsa is easy.

We remained encamped on the Sohopanee for the three following days, during which, I met the Chiefs of Nowgong, Loomtrya, Samsa, Bor Doobiya, Jafoo, Moonjee, and Aliepa. The Nagas come down here in very large numbers, and I was somewhat fearful of an outbreak; for a great many of the Chiefs were in a state of intoxication, and appeared to have very little control over their followers. We saw a marked difference in this respect here, and as we went on westward; hitherto we had found the Chiefs sober, and their orders readily obeyed; but henceforward we were to meet with nothing but drunken rabbles. In each village there are dozens of aspirants for power, and we had daily to witness brawls between them that threatened to be serious, and perhaps lead to collision with us; by great forbearance, however, on the part of my escort, things went on as well as could be hoped for, and we completed our tour without any untoward occurrence.

It may be right to mention here, an unfortunate circumstance that happened last year at Taratolla, in the plains. Some Nagas of Samsa had been down to trade, rather late in the season, and on their return, had to cross a small stream which had been dammed up, and at which about thirty or forty persons of the Non Cacharee Khel, were fishing: on the Nagas driving a bullock over the dam, a squabble ensued, and a poor Naga was killed. At the time this occurred, a rumour reached me that something of the kind had happened, and very particular enquiry was made into the matter. The reports of the Police, sent out to investigate it, and of the Mouzadars, led to the supposition that the man had died a natural death; and as the Nagas would not then come down, I was obliged to put the case by till the cold season: even when I was close to the Samsa village, I could get no one who was with the deceased to appear before me, but subsequently they came down, and I have no reason to think, that their statement, as given

above, is otherwise than true ; every exertion has been made by myself and my assistants to find out the individuals concerned, and a reward has been offered, under your authority. These Cacharees, however, are the most obstinate people possible, and it is but too probable, the guilty parties will not be discovered. Should it be found impossible to bring any of the parties to justice, I would ask permission to make some suitable present to the family of the deceased, to the extent of Rs. 100 or 150, when communicating to them the result of the enquiry. The matter is still under investigation.

On the 14th February we moved in the direction of Mikilae. We started at 7-30 A. M. and kept winding down the Sohopanee till 2 P. M. when we again encamped on that stream. About an hour after leaving our former encampment, we came upon a small piece of rice cultivation, called Baka Pathar. I was informed that many Assamese ryots took refuge here, to avoid the exactions and oppressions they were subject to, in the late rule of Rajah Poorunder Sing ; a few still remain, but they complain of the incessant demands made on them by the Nagas, and it seems probable that in a short time they will return to the plains.

On the 15th we continued our course along the Sohopanee, crossing and re-crossing it continually. After leaving it, we came upon frequent swamps, over which some frail bridges were thrown. On losing the swamps, we began to rise rapidly, and in about an hour reached the Mikilae. The whole distance occupied about four hours ; we passed on, and reached Mohom in little more than half an hour ; immediately under it we found an excellent spot to encamp upon, with good clear water on every side.

Mikilae is a very large and strongly stockaded village, and being See para. 49th. high and openly situated, it commands a good view of the country round about. This village has a feud with the Soomtiya Nagas, which will be presently alluded to.

We were obliged to halt for two days at Mohom to get up supplies. While here, I had interviews with the Chiefs of Mikilae, Akook and Mohom, and after the usual interchange of presents, they gave in their engagements. Mohom is a small village, with no defences.

On the 18th we started at 7-30 A. M. for Lakotee, which we reached at 10 A. M. At 8-15 we reached Akook, a long straggling village, and passed out of it at 8-35. The road is pretty good, for the most part

level. About a mile beyond Akook, it is narrow for some distance, with thick reed jungle on both sides; after getting out this, it began to improve, and as we neared Lakotee, it became wide and open.

Lakotee is a very extensive village, with good wide roads about it in every direction. Its height, taken by a mountain thermometer, was found to be nearly 4,000 feet, the greatest height reached in our tour. We remained here for two days, during which I met the Chiefs of Lakotee, Jangpang, Burgaon, Malusee, Lougjang, and Koreegaon.

We left our camp on the morning of the 20th at 7-15, and reached the end of Lakotee at 8, Koreegaon at 10, Saneegaon at 11, and our encamping ground under Misangaon at noon. With the exception of one narrow precipitous path, about a mile from Koreegaon, the road between it and Lakotee is good; it is wide and good from Koreegaon to Saneegaon, which are both villages of considerable size. After leaving Saneegaon, the road continues good for some distance, it then goes down a steep narrow path, and rises gradually to Misangaon. The latter part of the road had been cleared, or it would have been very bad.

Saneegaon is stockaded, but not very strongly, and there are no ditches; it is the first stockade we met with after leaving Mikilae, and this is said to have been put up in consequence of a misunderstanding with Lakotee, which has been adjusted. We met with no other stockades to the westward, except one recently made at Nowgong, in consequence of an incursion said to have been made on them by some of the Abor tribes, who live between the Bagtee and Dyang, and which will be noticed hereafter.

Our march on the 21st was very long and fatiguing, and leaving our camp at 8 A. M. we proceeded down a steep, rugged descent, and at 9-20, reached the Bagtee, a fine stream which falls into the Dyang. Shortly after leaving the Bagtee we came upon one of its feeders, called Kinnede, and waded up its bed till 11-30. We then passed over some narrow, steep, slippery ridges, till 1 P. M. when we crossed a stream, called the Sufedee, and after ascending for an hour reached Bhedaree; passing through this village, we again descended to the Sufedee, and encamped on it, between Bhedaree and Kaboong. A portion of the coolies did not get up till next morning, and this, and bad weather, obliged us to halt on the 22d, on which day I received visits from the Chiefs of Bhedaree, Kaboong, Durria and Tilleegaon.

On the 23d we started at 6-45, A. M. and passing through Kaboong at 8-15, and Durria at 9-35, reached at 10-40, our halting place, on a stream called Durria Panee, between Durria and Rangagaon. The road throughout this march was bad, and had been made worse by wet weather; it rose to Kaboong by the side of a precipitous hill, with scarcely room for the footing of a single person. From Kaboong to Durria it is pretty level, but narrow, and through dense reed jungle. The descent to the Durria Panee, is by a precipitous path of the same description.

On the 24th we moved about 7½ A. M. and passing through Rangagaon and Kergaon, and between Sunkah and Teelagaon, encamped about 3 P. M. on a small stream under Sonae, at a distance from it of about half a mile; this march was a fatiguing one, from the slippery and muddy state of the road, which would have been tolerably good had not rain fallen. The ascent to Rangagaon is steep; between it and Kergaon, the road is level, it then descends gradually to a stream which is crossed three times at short intervals. On leaving this, there is a fine wide road up an easy ascent to Sunkah, and from thence the road lay over undulating hills, to our encampment.

We were halted on the 25th, and I received visits from the Chiefs of Rangagaon, Kergaon, Seeka, Khoragaon, Talagaon, Sonareegaon, and Teelagaon. I also took the opportunity of going up to Sonareegaon and Teelagaon, the two largest of the Lotah villages. They probably contain about 4,000 inhabitants each. The other Lotah villages are comparatively small.

The Chief of Nowgong brought to my notice the aggression I have alluded to in para. 36th. There is no doubt that an incursion had been lately made, in which one of the Nowgong Nagas was killed, and another wounded; but it is doubtful what tribes were concerned in it. The Chief of Nowgong accused the Nang Chang and Pengsa Abors, but admitted that it could scarcely have happened without the connivance of the Sonaree and other Lotah Chiefs. A reference to the map which Mr. Bedford has prepared, will shew that if these Chiefs had been so inclined, the attacking party would in all probability have been cut up on their retreat. Nowgong is visible from Sonaree, and also from Teelagaon, and as these villages would be instantly aware of the attack, and could immediately communicate with Teelagaon and Sunkah, had they turned out

in force, it is nearly certain that the party would have been intercepted. The Sonaree Chiefs denied all knowledge of the matter; but I may mention that they were generally in a state of intoxication, and that it was not easy therefore to deal with them. Conformably with the views expressed by His Honor the President in Council, in para. 4th, of Mr. Assistant Secretary P. Melville's letter, No. 36, of the 1st February last year, I requested the Chiefs to give me their aid in obtaining an interview with the Abor tribes, which they promised to do, but it has not been accomplished as yet.

An occurrence, however, that has lately taken place in this direction, which is reported in a letter from Mr. Wood, the Sub-Assistant, stationed at Golaghat, No. 64 of the 4th ultimo, copy of which is annexed, will render a further communication with these Chiefs necessary in the ensuing cold season. It appears that six elephant hunters, while out hunting under the hills, were attacked by about thirty Nagas, who plundered whatever they could lay hold of, and wounded some of the hunters. Two of these escaped with their lives, and some are missing, and supposed to have been murdered. When applied to by Mr. Wood, the Lotah Chiefs objected to coming down to the plains in consequence of the lateness of the season, and I consider this objection reasonable enough. It is probable that they will come down when the rains are over, and give the explanation required of them, and until they refuse this, it seems unnecessary to take any measures of coercion. It is doubtful in my mind what tribe are the offenders, but from some of the depositions taken by Mr. Wood, and from the nature of the case, as detailed by him, I am inclined to think, that the affrays may have arisen from the Nagas supposing that they alone have the privilege of hunting wild elephants in the place where it occurred. It happened within the jurisdiction of the principal assistant at Nowgong, and I should wish to be furnished with instructions, as to whether the enquiry shall be made by him or by myself.

On the 26th we moved down to the plains; passing close under Sonareegaon, we turned off to the right to Nowgong, and reached it in about two hours, another hour brought us to the Dyang. The first part of the road between Sonareegaon and Nowgong is wide and open; in a short time, however, we entered narrow and difficult passes cut through the hill: these led to a small stream, up the bed of which



we passed for about half a mile, and then got into a narrow path through high reed jungle, which continued till we reached Nowgong; after leaving this, we descended rapidly, till we came near to the level of the plains, and then passed through very heavy reed jungle, till we came out on the Dyung. After proceeding down thus for about two hours, we encamped on one of its sands.

On the 27th we continued our route, following the course of the Dyung. After a very long march, we encamped a little above Nogora, and reached Golaghat next day about 2 P. M. The country under the hills is a wild, dreary, swampy forest, and continued so till we came out at Nogora. There was nothing like a road or even a beaten path, which is accounted for, by the Lotah Nagas generally using boats.

In my report of the 15th September 1841, I have mentioned that the Naga tribes are distinguished by the names of Boree and Abor—the former being dependent, and the latter independent tribes. To the eastward, however, the Boree Chiefs who acknowledge a kind of dependance on us, have numerous Abor tribes tributary to them, which I did not find to be the case to the westward. There is here, therefore, considerably great difficulty in ascertaining the merits of any dispute, in which one party are Boree, and the other Abor; the former being bent on preventing all kinds of intercourse between us and the Abor tribes. It is only when they meet with some reverse, that they ask for aid; and then it is probable, that they will do nothing, but in furtherance of their own ends, which are to slaughter their enemies, burn their villages, and drive them to the jungles.

Having taken engagements from all the Boree Chiefs to abstain from warfare, it seems necessary, that the officer, in charge here, should be furnished with instructions as to how far he should interfere in their quarrels. It is obviously desirable, that he should do so as little as possible, but in the following cases it seems necessary:—

1st. In any attack by one Boree tribe on another. In this case both parties might be summoned down, and in the event of refusal to come, or to settle the dispute as directed, their village might be occupied till they complied. 2d. In an attack by a Boree on an Abor tribe, dependent or independent of a Boree tribe. On proper complaint being made in a case of this kind, the same course might be followed. In both

cases, the parties complained against are our dependents, and we have a clear right to their submission.

These are the only cases in which it seems to me to be absolutely necessary that interference by force should take place. But in the event of a Boree complaining against an Abor tribe, every means might be taken—either through the Boree Chiefs, on whom they are dependent ; or if not so dependent, through any Boree tribe which may be on friendly terms with them—to induce the Abor tribe to come down, and submit their dispute to adjustment. If this cannot be accomplished, I am of opinion, that interference should not take place ; for I believe that in almost every case of the kind, the Boree tribe could point out means by which the Abors might be got down, and that it is for objects of their own, that they do not do so. Before leaving this part of the subject, I would beg to mention again, what I stated in the 7th paragraph of my letter of the 15th September 1841, that I believed the Assam Government had found it more convenient to conciliate the Nagas by presents, than to overawe them by coercion ; and I am still of opinion that the Political Officer, who has charge of the relations with these tribes, should have power to dispense presents liberally.

I may here state, that the following applications have been made to me, since I returned to Seeksagur.

The Chief of Boora Hymoong, came in on the 9th of March, and reported that his village had been burnt and plundered by the Nagas of Losiatua, Booragaon, and Loougliooug ; these were summoned through their Kutokies, but objected to come to the plains so late in the season. It turned out, however, that the matter had been much exaggerated, and that the affair originated in some claims of certain Nagas who had left Boora Hymoong, and settled in Booragaon. The Chief of Boora Hymoong afterwards acknowledged, that the Loougliooug Nagas had returned what they took away ; and I hope that after the rains, the matter will be adjusted with the other parties.

On the same date, the Loongjang Chief complained, that two women of his village had been cut up in their fields by the Moongjing Nagas. The Kutokies were directed to summon the Chiefs of Moongjing, who also objected to come down to the plains at that season, and nothing further can be done till November or December next.

The Mulotopeah Chief came in on the 9th April 1844, and mentioned that his tribe were afraid to come to the plains, from fear of being waylaid by the Langtooug and Nowgong Nagas, on account of an old feud. This Chief said, he would come in again after the rains, and I hope to be able to adjust the matter to the satisfaction of the parties.

Besides these cases which have lately been brought to notice, there are the following, which I was unable to adjust while in the hills, from not being able to bring the parties together.

A feud between Mikilaie and Losuctuja early in 1834. The Chief of the former tribe complained, that 14 of his men had been cut up by the Hatheegurh Nagas. These denied all knowledge of the matter, and said it was probably done by the Soomtiya Nagas, who were at enmity with Mikilaee. The Soomtiya Nagas deny it, but allow that there is an old feud between their tribe and Mikilaee, and I will endeavour to bring the parties together at the earliest period possible.

About the beginning of December last, the Sonarree Chiefs complained that the Topoo and Tootee Abors had carried off and detained a boy and girl from their village; I had hoped to have settled this, but could find no means of getting the opposite party present. It would appear that the Nagas in this direction are in the habit of making captives, with a view to obtain ransom.

The following occurrences among the Nagas to the eastward have been brought to notice.

I received a report towards the end of November last, that the Paundwar, Makrong, and Singpoongiya Nagas, had cut up three men, belonging to Horoo Bansary. On enquiry it turned out, that Mokreng or Koting-gaon is tributary to Horoo Bansary; and that a Naga belonging to the former tribe had gone with tribute to the latter, and was put to death. The Koting Nagas shortly after this, cut up the three men alluded to. The Pandwar Chief came in himself, and stated that he was in no way whatever concerned in the matter; he thought the dispute might be settled through the Burdwar and Namsang Chiefs; and they were applied to, but I have not heard that they have yet been able to adjust it. Both parties in this case are Abors.

A report reached me at Boora Hymoong, that the Khetree Nagas had, on the 18th of January, attacked Boonting-gaon, burning the village and killing eight men. Both parties are Abors, and I fear there is

little chance of doing any thing in this direction, without the assistance of the Namsang and Burdwar Chiefs, who shew any thing but a readiness to give it.

On the 8th of April, a complaint was made to Mr. Bedford at Jai-pore, by the Baufera Nagas, who stated that two men and a woman belonging to their village, had been put to death in Horoo Mootoon. An enquiry was immediately directed; and on the 24th of May, the Naga Chowtangs of both villages came before me, and stated that the parties put to death were slaves, who had run away from Baufera, and that according to the Naga custom, they had very properly been put to death. The Baufera Chowtang said, that this should have taken place in presence of both parties, and on the borders, and not at Horoo Mootun, but that the matter had been settled amicably among themselves.

On the 1st of May the Chowtang of Jaboka reported that he was fearful of being attacked by the Abors of Seuhoon, Roodooa, Kyouting, Poomau and Mijuo. A guard from the Assam militia was offered for their protection, but the Chowtang said it was unnecessary; that the village could take care of itself till the rains were over; and if matters were not adjusted then, he would make another report.

Before concluding this report, it may be convenient to refer to my reports of the 15th September 1841, and 9th April 1842, regarding the habits of the Nagas, their defences, arms, &c. and to observe that the observations made therein, will apply generally to the tribes I met with in my present tour. The villages we met with in the tour, are in general, large and thickly populated, the largest may contain from 4000 to 5000 inhabitants, and few could have had less than 2000.

The Naga country lying between the Diko and Dyang, is divided into six Dwars, as follows: Namsang, Dopdar, Charingaya or Asringiya, Hatheegurhiya, Dyungiya and Paneephath. A list of villages comprised in these Dwars, is appended.

The Nagas of Namsang Dwar enter the plains in Gelakee, and exchange cotton, cloths, ginger, pepper and beetlenut, for salt, rice, dhan, daws, cattle, poultry, and dried fish. These are the principal articles of exchange in all the other Dwars; but raw cotton is brought down by the westerly Dwars, particularly by the Paneeput or Lotah tribes; this cotton, or the bulk of it, is exchanged in the first instance by the above

Nagas to the Borees, for their own products and products of their plains, and it is then brought down by the Boree Nagas, and exchanged to the Assamese; a small quantity comes down at Dopdar, and larger quantities at the Dwars west of it.

The Dopdar, Charingaya, Hatheegurh, Dyungiya, and Paneephat Nagas, come down respectively by Dossdur, Taratollee, Morecomee, Bosa, and Mokrung. In Bosa and Mokrung there are several Passes.

To each of the Dwars are attached Kutokies, who are the channel of communication between the Government Officers and the Boree Nagas; these were formerly paid for their services by a remission of the poll tax, and they now receive a remission on their land, equal to what was remitted when the poll tax existed; some of them derive advantage from having the management of Khats, which the former rulers of Assam gave certain of the Naga tribes, and to which they attach importance; a list shewing the number of Kutokies, their allowances, and the Naga Khats, and quantity of land in each, as far as is known, is annexed to this report.

The Lotah Nagas had formerly Khats on the Morung side, and they are particularly anxious to obtain an equivalent for them on this side of the Dhunsuree. The Khats they formerly held are either out of cultivation, or taken up by the ryots; and I would recommend that they be allowed to take up from 30 to 40 Poorahs of any Puteet land they can point out. The value they attach to these Khats, is a great security for their peaceable behaviour.

Mr. Masters has kindly favoured me with his observations on the botany of that portion of the hills which we passed over, and which I have much pleasure in submitting with this report. Mr. Bedford has also made a most accurate map of our route, including all villages seen from it, which will be of great use hereafter. To both these gentlemen, I am under considerable obligations, for the assistance they gave me on many occasions.

Our tour was necessarily a very hurried one; I could have wished to remain longer in almost every place, but we started in rain, and had a good deal of it in the hills; and I was fearful of being driven down before I had completed the tour; and in fact continued and heavy rain set in immediately we left the hills. We have now, however, a knowledge of the localities of all the tribes on our borders, and for some distance

in the interior, and they can be visited at any time there may be occasion for it. It is hardly to be supposed, that a barbarous people, who have lived and gloried in war for ages, will at once leave off their wild habits; and no doubt we shall have to remonstrate with them frequently; but I have every reason to think, that less bloodshed now takes place than formerly, and it is to be hoped, that all these tribes will fall gradually into more peaceful habits.

I cannot conclude this report without again bringing to notice, the very great assistance I derived from Noramaee Dekka Phokun, Naga Surburakar, in my dealings with the Chiefs who visited me. He was far from well when we started, and had frequent attacks of fever, but nothing would induce him to leave his post, and he continued with me throughout the tour, under circumstances in which few of his class would have remained.

I beg to submit a Bill for the expences incurred on the present expedition, which I beg you will recommend being passed.

*P. A. Comr. Office; 6th Aug. 1844.*

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# JOURNAL

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## DRAFTS FOR A FAUNA INDICA.

(Comprising the Animals of the Himalaya Mountains, those of the Valley of the Indus, of the Provinces of Assam, Sylhet, Tipperah, Arracan, and of Ceylon, with Occasional Notices of Species from the Neighbouring Countries.\*)

By ED. BLYTH, Curator of the Asiatic Society's Museum, &c. &c.

No. 1. The *Columbidæ*, or PIGEONS and DOVES.

Order IV. GYRATORES, Pr. Bonap. GEMITORES, McGillivray.

This consists but of a single family, that of the Pigeons,—

Fam. *COLUMBIDÆ*,—

Which subdivides into three marked sub-families, viz.—*Treroninæ*, or arboreal fruit pigeons,—*Gourinæ*, or ground pigeons,—and *Columbinæ*, or ordinary pigeons and doves.

\* The object of publishing the present series of Monographs of various groups of animals, is to elicit, as much as to impart, information that might be incorporated in a general work now in preparation; and it is, therefore, earnestly requested that observers, interested in the subject, will favour the author with any additional facts or corrections that may occur to them, and that they will also endeavour to settle any questions that are still at issue, and in short, to render the future conspectus of Indian animals as complete as circumstances will permit of. In the class of birds, it may be here remarked, that any information on the nidification and colour of the eggs of species generally, and of the song-notes of the smaller *Insector*es, will be particularly acceptable.

Sub-fam. *TRERONINÆ*.

The members of this group are eminently frugivorous and arboreal, scarcely ever descending to the ground, and some perhaps never, unless to drink;\* and in general they are of a green colour, which renders them difficult to discern amid the foliage of trees. They are distinguished from other pigeons (with the sole known exception of *Ectopistes carolinensis*,) by having constantly fourteen tail-feathers, instead of twelve.† In form of bill, they present a gradation from the strongest beak that occurs throughout the order, to a feeble organ, soft and tumid to near its tip, which alone is corneous; but the gape, especially in the latter case, is very capacious. The tarsi are short, stout, and more or less feathered; and the toes (except in one sub-genus) are remarkably broad-soled, and are furnished with strong and sharp claws, commonly much hooked; hence they have great power of clasping, or holding on to the small branches of trees, while straining to pluck the fruit or berries from the terminal sprays; so that, when feeding, these birds may be commonly observed to lean over and downward so far as to be inverted, and then draw themselves back by the unaided muscular strength of the extremities. The flight of all is powerful and rapid. Three strongly marked genera occur, numerous species of which inhabit the warm regions of the Old World, Australia, and Polynesia; but from America they are wholly excluded.

Genus *TRERON*, Vieillot: *Vinago*, Cuvier. (*Hurrial* and *Hurruwa*, H.; *Hurtel*, Beng.; *N'goo*, Arracan). The *HURRIALS*.

In this genus may be observed the gradation in form of bill, that has been adverted to, in its full extent; but all the strong-billed species are here included. The plumage is blent and glossless, and almost without exception of a lively green, varied with ashy, and with a stripe of bright yellow on the wings margining their coverts; while the males are commonly further adorned with a deep maroon hue‡ on the

\* An individual of *Treron bicincta*, has been seen feeding on the ground; but such instances are extremely rare. *Vide*, also, description of *Tr. nipalensis*.

† Perhaps, however, certain of the ground pigeons may also have more than twelve tail-feathers; which remains to be ascertained. In the domestic breed of *fan-tails*, the number is abnormally multiplied to as many as thirty or more. It is very remarkable that of the two species of *Ectopistes*, which are nearly allied to each other, one should have fourteen tail-feathers, while the other—the celebrated passenger pigeon of North America, should possess but the usual number—twelve. This fact was observed and recorded by the Prince of Canino.

‡ This hue, in different shades of vinous, or claret-colour, occurs in a great number of *Columbidæ*, and has been remarked to be almost peculiar to the tribe.



mantle, and with orange, or orange and lilach, on the breast. Irides crimson, with a blue ring encircling the pupil.\* The voice, a melodious deep-toned whistle, considerably prolonged and varied in different cadences. Nidification, as in most other arboreal doves and pigeons, and two white eggs produced, of a somewhat less elongated shape than in common pigeons. Except in the pairing season, these birds collect in small, or moderately large flocks, on the topmost branches of high jungle trees, where, if one can be descried and is shot at, two or three will commonly fall, that had eluded observation from the similarity of their colouring to that of the foliage. They subsist on fruits and berries of all kinds, and during the season, especially on the small figs of the *Ficus indica* and *F. religiosa*; and they have likewise been observed "devouring the blossoms and newly formed fruit of the mangoe and tamarind trees." Their flesh is esteemed for the table, but the skin requires to be removed, this having a strong bitter taste; and hanging them up for a day or two, when the season will permit of it, improves them much for culinary purposes.

It is necessary to distinguish three well marked sub-genera, as follow,—

*A. TORIA* (since altered to *Romeris*), Hodgson. Distinguished by the great strength and vertical depth of the corneous terminal portion of the beak, which, in the typical species, is continued back to beyond the feathers of the forehead. The eyes are surrounded by a naked space.

*TR. NIPALENSIS*: *Toria nipalensis*, Hodgson, *As. Res.* XIX, 164. (*Thorya*, quasi *rostrata*, of the Nepålese.) Green, yellowish below and towards the tail; the crown of the head ash-coloured; mantle of the male, deep maronne-red, and a faint tinge of fulvous on the breast; primaries and their larger coverts, black, the latter margined with yellow; middle tail-feathers green, the rest with a blackish medial band, and broad grey tips; lower tail-coverts cinnamon-coloured (more or less deep) in the male; subdued white, marked with green, in the female. Bill, greenish-white, with a large vermillion spot occupying the membrane at the lateral base of the mandibles: legs also vermillion:

\* A partial exception to this occurs in *Tr. nipalensis* only, among the Indian species; at least, the only two living specimens of this bird which I have seen, had dark red-brown irides, with a blue inner circle. Mr. Hodgson describes them as—"outer circle of the iris orange-red, inner circle blue."

irides deep red-brown, with a blue inner circle ; and orbital skin, bright green. Length, ten inches and three-quarters, by seventeen inches ; closed wing, five inches and three-quarters.

This bird inhabits the central and lower hilly regions of Nepal, and more abundantly, those of Assam and Arracan, spreading southward to the Tenasserim provinces and Malay peninsula. It also occurs in the hilly districts of Bengal, but rarely strays into the plains, though specimens are occasionally met with even near Calcutta. Mr. Hodgson states that—"It is not very gregarious ; adheres to the forests ; feeds chiefly on soft fruits ; and prefers the trees to the ground, but without absolute exclusiveness of habit in that respect."

Most closely allied and hitherto confounded with it, is *Tr. aromatica* of Java, and I believe of the more eastern portion of the Malayan Archipelago generally, (the *Col. curvirostris*, and the female—*C. tannensis* of Gmelin).\* The latter differs by having a bright yellow beak, greenish at sides towards base, and the nude skin at the sides of its base is apparently blue, fading into a blackish tint in the dry specimen ; while in *Tr. nipalensis* the vermilion colour fades to amber ; the anterior half of the crown is much more albescent ; the fulvous tinge on the breast much stronger ; the maroon colour of the back is more extended ; the longest tertiaries are greenish-dusky, instead of green ; and the lower tail-coverts are of a deeper cinnamon-colour. Lastly, the corneous portion of the upper mandible scarcely extends quite so far back as in *Tr. nipalensis* ; and a curious and marked distinction consists in the Indian species, having the inner web of its third primary sinuated, as in the Hurrials of the next section ; while its closely allied Javanese representative exhibits no decided trace of such a character. In a third species which I refer to this section, the *Tr. Capellei*, Tem.† (common near the Straits of Malacca), the beak is lengthened by the prolongation of its soft and tumid basal portion, becoming, as remarked by Mr. Strickland, "almost vulturine in form ;" while the size of the bird is considerably larger,

\* Mr. G. R. Gray's figures of the beak, &c., of a species of Hurrial to which he applies the name *aromatica*, in his illustrated work on the genera of birds, refer to a species of the following section of this genus.

† *Treron magnirostris*, Strickland, *An. and Mag. N. H.*, 1844, p. 116, and doubtless *Vin. giganteus* of Raffles, mentioned in the "Catalogue of Zoological specimens" appended to Lady Raffles's 'Life of Sir St. Raffles,' p. 674 ; though not the bird referred to in the note attached, which is probably a *Carpophaga*.

and, it may be added, that the sinuation of the interior web of its third primary exists, but not to the same depth as in *Tr. nipalensis*.

*B. Typical TRERON.* Hurrials, with the beak moderately robust, much less so than in the preceding section, its corneous portion occupying the terminal half, or thereabouts. There is no bare space round the eyes; and the tail is squared. Sinuation of the third primary well developed in eight species examined, and probably, therefore, throughout the group.

*TR. PHÆNICOPTERA: Col. phænicoptera*, Latham: *C. militaris*, Tem.: *C. Hardwickii*, Gray (figured in Griffith's 'Animal Kingdom,' VIII. 299): *Vinago militaris*, Gould's 'Century', pl. LVIII.\* Green. The neck all round, with the breast, bright yellowish-green, having a shade of fulvous; cap, sides of base of neck, and the abdominal region, ash-grey, the belly, with generally some admixture of green, more or less developed, and there is a green tinge on the forehead; shoulder of the wing lilach in the male, and a trace of the same in the female; greater wing-coverts margined with pale yellow, forming an oblique bar across the wing; terminal two-fifths of the tail, ash-grey above, albescent underneath, and its medial portion blackish underneath, and deeply tinged with green above; tibial plumes (extending partly down the tarse) and central abdominal feathers between the tibiæ, bright yellow; vent mingled white and green; and lower tail-coverts maronne, with white tips. Beak, whitish; the feet, deep yellow. Length twelve and a half, by twenty-two inches; and of closed wing seven inches to seven and a half.

This is one of three closely allied species, each having its peculiar habitat, and it is intermediate in its colouring to the two others,—namely, *Tr. viridifrons*, nobis, of the Tenasserim provinces, and *Tr. chlorigaster*, nobis, of Peninsular India. *Tr. viridifrons* is distinguished by having the anterior half of the head, and the medial portion of the tail, of the same (and as bright) yellowish-green as the breast, though somewhat less fulvescent; that of the tail being *well defined*, and contrasting strongly both with the grey tip, and also with the grey

\* Mr. G. R. Gray identifies this bird with *Col. Stæ. Thomæ* of Gmelin, to which name he assigns the precedence: but I decidedly think that he is mistaken in so doing.—I perceive also that in Griffith's 'Animal Kingdom,' *Col. Stæ. Thomæ* is referred to *militaris* of Temmink; this last named author having stated that *C. Stæ. Thomæ* occurs in India.

coverts impending the tail, so that this green appears as a very conspicuous broad caudal band : the throat also is not weaker-coloured, as in *Tr. phanicoptera*. *Tr. chlorigaster*, on the other hand, has the whole under-parts green ; no trace of green upon the tail, except at its extreme base, and the whole cap and ear-coverts are ashy, devoid (in fine males at least) of the slightest tinge of green on the forehead. These are, in fact, three osculant races, which, if commonly inhabiting the same districts, would doubtless intermix and blend, like *Coracias indica* and *C. affinis*, and likewise certain of the Káldige pheasants (*Gallophasis*) ; but within their own proper range of distribution, each continues true to the colouring which distinguishes it from the others. To term them local varieties of the same species, would not merely imply that the three are descended from a common origin, but also that *such* changes of colouring are brought about by difference of locality ; a notion which is inconsistent with the fixity and regularity of markings we observe in either race, over an extensive and diversified range of country. *Tr. phanicoptera* is a very abundant species in Bengal, Assam, Sylhet, Nepal, and all Upper India, its range extending southward at least to the foot of the mountains of Central India, where it would seem to be equally common with the next, and intermediate specimens are met with even in Lower Bengal. In Arracan it does not appear to have been met with, but farther southward, in the Tenasserim provinces, it is represented by its other near affine, *Tr. viridifrons*.\*

TR. CHLORIGASTER, nobis, *J. A. S.* 1843, p. 167 : *Tr. Jerdoni*, Strickland, *An. and Mag. N. H.*, 1844, p. 38 : *Vinago phanicoptera v. militaris* of Southern India, *Auctorum*. Similar to the last, except in the particulars already mentioned. It replaces *Tr. phanicoptera* in the

\* Capt. Hutton writes me word from Mussooree, that *Treron phanicoptera* is "common in the Deyrah Doon, but never mounts into the hills, where it is replaced by *Tr. sphenura*. Many of the Doon birds" he adds, "have come to be regarded as hill species, from their commonly occurring in collections made by residents at the different hill stations. Such collectors, however, entertain one or more *shikarrees*, who start off sometimes to the Doon, sometimes to the interior of the mountains, just as they happen to remember or to want any bright-coloured bird ; and when the collection is brought in, the collector never dreams of asking where the birds were shot, but puts them all down together as 'a collection from the hills.' Nepal being further to the south-east than Mussooree, a greater elevation may be required to produce the same temperature that we have ; so that birds, which with us are found *only* in the warm valley of the Doon, may *perhaps* in Nepal rise to a certain elevation on the mountains !"

Peninsula of India, and specimens are occasionally met with in the vicinity of Calcutta. These three species have the feet of a deep yellow colour; whereas in all the other Asiatic Hurrials, they would appear to be bright red.

TR. BICINCTA : *Vinago bicincta*, Jerdon, *Ill. Ind. Orn.* Pl. XXI; *Madr. Journ.* 1840, p. 13, (the male); and *V. unicolor*, Jerdon, *ibid.* (the female): *V. vernans*, var. Lesson's *Traité*. (*Chota Hurrial*, Hind,—Bengal). Green: the forehead and throat, brighter and more yellowish, as are the whole under-parts of the female, passing in both sexes to bright pale yellow towards the vent; occipital region, ash-grey; a stripe of yellow along the wing, formed by the margins of the greater and outer coverts; tail, grey above, with a blackish medial band on all but its middle feathers; beneath blackish, tipped with greyish-white; and its lower coverts, cinnamon-coloured in the male, and mingled dusky-ash and buffy-whitish in the female. The male is further distinguished by having a large buff-orange patch on the breast, and above this a lilach band, broader at the sides. Bill, greenish-glaucous; and the legs deep pinkish-red. Length eleven or twelve inches, by twenty, or nearly so; and of wing generally about six inches, rarely as much as six and a half.

This beautiful species is common to all India, but would seem to be more numerous in Lower Bengal than in the Peninsula; and it occurs plentifully in Nepal, Assam, Sylhet, Tipperah, Arracan, and the Tenasserim Provinces. In Bengal, however, it is much less numerous than *Tr. phænicoptera*; and the flocks of the two species do not commingle. I once found its nest, half-way up a small mahogany tree, in the Calcutta Botanic Garden. The eggs, of a somewhat less lengthened form than in pigeons generally, measured an inch and a quarter in the long diameter. I have also obtained the young, which resemble in colouring, the adult female. The voice is much the same as in *Tr. phænicoptera*.

Mr. G. R. Gray has erroneously identified this bird with *Tr. vernans*, (L.), common in the Malay countries. The latter differs in its smaller size, having the wing but five inches and a half; in the male having the entire crown and throat grey, instead of green; in the very much greater development of the lilach colour above the orange of the breast, this enveloping the whole neck, whereas in *Tr. bicincta*, it is confined to a band above the breast; and in the tail being grey above, with a blackish *terminal* band, and slight greyish extreme tips to the feathers; whereas,

*Tr. bicincta* has a broad whitish terminal band to the tail, as seen underneath, and which appears of a dull ash-colour above. No two species can be more obviously distinct.

TR. MALABARICA : *Vinago malabarica*, Jerdon, *Ill. Ind. Orn.* (Art. *V. bicincta*) : *V. aromatica*, apud Jerdon, *catal.* (the male) ; and *V. affinis*, Jerdon, *ibid.* (the female) : also *V. aromatica* of Southern India, Jardine's *Nat. Libr., Columbidae*. This bird exactly resembles *Tr. nipalensis* in size and colouring, except in having a yellower throat in both sexes ; but is at once distinguished by the very different form of its beak, and by having no naked space round the eyes ; the buff tinge on the breast of the male is also more decided ; and its legs are 'lake-red.' The female may be distinguished from that of *Tr. bicincta*, by the ash-colour of its forehead and entire crown, and by its unspread tail being wholly green above.

Mr. Jerdon's specimens of this bird were obtained on the Western Coast of the Peninsula, and at the foot of the Neilgherries. I have never seen it from Northern India ; but to the eastward it inhabits Assam,\* Sylhet, Tipperah, and appears to be equally common with *Tr. nipalensis* in the island of Ramree, Arracan.

There is a nearly allied species in the Nicobar Islands, *Tr. chloroptera*, nobis, which differs in its superior size, having the wing seven inches, instead of six to six and a quarter ; and in the male having a large portion of the fore-part of its wing green, instead of deep maronne ; its breast also is less tinged with fulvous, and the forehead more albescent.

*Columba pompadora*, Gmelin, founded on Pl. XIX and XX of Brown's Zoology (1776), should be another nearly allied species, inhabiting Ceylon : but as both figure and description represent the back to be green, instead of maronne, like the rest of the mantle ; and as it is also described as "smaller than the turtle-dove," it clearly cannot be *Tr. malabarica*, and is probably a sort of representative (as regards its diminutive size) of *Tr. olax* of the Malay countries.

C. SPHENURUS, Swainson : *Sphenocercus*, G. R. Gray. Hurrials with cuneiform tail, of which the central feathers are, in some species, much elongated beyond the rest, and their prolonged tips attenuated ; with the basal two-thirds or more of the bill soft and

\* It is figured among Dr. McClelland's drawings of the birds of Assam.

tumid; and with the soles of the toes narrow, whereas in the preceding sections they are particularly broad and flat: a nude livid space surrounds the eyes, but less developed than in the first section; and the curious character observable throughout the preceding group, of having the inner web of the third primary abruptly sinuated, does not exist in the present one. These birds are exclusively mountaineers, inhabiting the hill-forests, and are remarkable for the music of their notes.

TR. SPHENURA: *Vinago sphenura*, Vigors, *Proc. Zool. Soc.* 1831, p. 173; Gould's 'Century,' pl. LVII: *Kokla*, or *Kokhela*, H. (a name also applied to the next species). Very similar in colouring to *Tr. nipalensis* and *Tr. malabarica*, but larger, and at once distinguished by its cuneiform tail; by the greater development of the soft basal portion of its bill; also by the green colour tinged in the male with buff of its crown; by the considerable diminution of the maroon colour on the mantle of the male, especially on the back, the posterior scapularies, the tertiaries, and the great wing-coverts, being green; and by having but a slight pale yellow margin to only the great coverts of the wing. Tail, green above, with an ill-defined subterminal dusky band to its outer feathers, and uniform dull albescent-grey, underneath; its lower coverts long, and of a pale rufous-buff hue in the male, yellowish-white with green centres in the female, as are likewise the short outer ones of the male: breast of the latter, deeply tinged with buff. In the female, the subterminal dusky band on the three outer tail-feathers, is much better defined. Irides, coloured as usual; the bill, and nude skin around the eye, livid; and legs, coral-red. Wing, seven inches to seven and a quarter: middle tail-feathers, five and three-quarters.

This species inhabits the Himalaya, and is, I believe, more abundant in the south-eastern portion of the chain, as in Nepal and at Darjeeling; though it is also common at Simla. Capt. Hutton writes, from Mussoorie,—“ This species is very numerous in the hills from April to June, when, having reared its young, and the rains having set in, it becomes scarcer, and gradually disappears during the rainy season. The nest is in high trees, composed of dried twigs, a mere platform; and the eggs are two, and white. I heard the first *Kooklah* this year on the 12th of April.” It is greatly prized by the natives as a cage-bird, on account of its singularly prolonged and varied musical note, which is an improvement upon that of *Tr. phanicoptera* and its allies. A few are even brought in cages to Calcutta, and sell at a high price, as song-birds.

I have heard the notes of both this and the next species, which I think are absolutely similar: they bear some resemblance to the human voice in singing, and are highly musical in tone; being considerably prolonged and modulated, but always terminating abruptly; and every time the stave is repeated exactly as before, so that it soon becomes wearisome to an European ear.

TR. CANTILLANS: *Vinago cantillans*, nobis, *Journ. As. Soc.* XII, 166: *Col. aromatica*, var. A, Latham. Size and proportions of last, but the green colour replaced by a delicate pearl-grey, with a slight tinge of green here and there, more especially on the under-parts: forehead and throat whitish; the crown and breast of the male tinged with ruddy, or weak maronne; and the mantle marked as in *Tr. sphenura*, with deeper maronne: a slight yellowish-white outer edging to the greater wing-coverts. Irides, as usual in this genus, or having a crimson ring encircling a violet one: bill and bare skin around the eye, glaucous-blue: and legs and toes, reddish-carneous. The female I have not yet seen. Length, thirteen by twenty-one inches; closed wing, seven inches.

This species occurs in the N. W. Himalaya, as about Simla; and is, I believe, rare in Nepal. I kept one alive for some time, that was stated to have been brought from Agra; whither it had no doubt been carried from the Hills. Can it be a variety only of the last?

TR. APICAUDA, Hodgson (mentioned in Mr. G. R. Gray's Catalogue of the Ornithological Specimens in the British Museum). Nearly allied to *Tr. oxyura* of the Malay countries, from which it is at once distinguished by the pale yellow margins of its great wing-coverts, forming two narrow longitudinally oblique bars on the wing. General colour green, more yellowish towards the tail, and on the under-parts; and tinged in the male with russet on the crown and breast: primaries, dusky-black: tail with its middle feathers greatly prolonged beyond the rest, and their elongated portion much attenuated; its colour, grey with a medial blackish band, obsolete on the middle pair of feathers, which at base are yellowish-green. Bill, evidently glaucous-bluish; and legs red. Length of wing, six inches and a half, and of middle tail-feathers, eight inches or more, passing the next pair by about three inches.

Inhabits the south-eastern Himalaya and the hill ranges of Assam; being tolerably common at Darjeeling.



Genus *CARPOPHAGA*, Selby (1835): *Ducula*, Hodgson (1836).  
*Dukul*, or *Dunkul*, H. The DUNKALS.

These fruit pigeons are mostly of large size, with broad-soled feet and strong hooked-claws, much as in the typical Hurrials, and a slender, generally somewhat lengthened, bill, having the terminal third only of its upper mandible corneous, and the plumage of the chin advancing very far forward, underneath the lower mandible. In a few species the base of the upper mandible expands to form a fleshy knob. Wings, in all the typical species, adapted for powerful flight. The plumage of the head, neck, and under-parts, and in some species, throughout, is blent and glossless, and mostly of a delicate grey, or a vinous hue, with never the peculiar burnish on the sides of the neck, so general among ordinary pigeons; but many species have the upper-parts, wings, and tail, shining metallic green, which in some is bronzed or coppery, in others varied with rich steel-blue; hence, several are among the most shewy of the pigeon tribe; others, however, being simply black and white, though all are alike handsome when viewed in the fresh state, from the delicate beauty of the irides, bill, feet, and any nude skin about the head, the exquisite colouring of which is lost in the dry specimen. These birds are more especially developed in the great Oriental Archipelago, where the species are very numerous, two only occurring in India, and others in Australia and Polynesia. They are gregarious, like the Hurrials, and keep exclusively to the great forests, more especially to those of upland districts: and it would appear that they do not generally lay more than a single egg, and certain species invariably but one; in which respect they resemble the celebrated Passenger Pigeon of North America (*Ectopistes migratoria*). At least three sub-genera occur, at the head of which may be placed *Lopholaimus*, G. R. Gray, founded on the *Col. antarctica*, Shaw (v. *dilopha*, Tem.), of Australia; then follow the ordinary Dunkuls, of which the two Indian species are characteristic; and finally a short-winged type, with bill and feet as in the former, and colouring as in the division *Chalcophaps* (of the next sub-family), to which I apply the appellation *Dendrophaps*.

C. INSIGNIS: *Ducula insignis*, Hodgson, *As. Res.* XIX, 162: *Carp. cuprea*, Jerdon, *Madr. Journ.* 1840, p. 12, and subsequently referred by him to *Col. badia*, Raffles, *ibid.* 1844, p. 164. (*Dukul*, Nepal; *Dunkul*, H). Head, neck, and under-parts, pale ruddy lilach-grey; the

throat, albescent; and crown, pure cinereous in some specimens, in others tinged with ruddy; back and wings, deep vinaceous-brown; the rump and upper tail-coverts dusky-cinereous, and the lower tail-coverts buffy-white: tail dusky, with its terminal fourth dull-ashy above, and albescent as seen from beneath. Bill, circle of eye-lids, and legs, intense sanguine, except the tip of the bill and the claws, which are horn-coloured; orbital skin, livid; and irides, "hoary or blue-grey," according to Mr. Hodgson,—"red," as stated by Mr. Jerdon. Length, twenty inches, by two feet and a half (Hodgson); nineteen by twenty-six inches (Jerdon); of wing, nine inches and a half; and of tail, eight inches. Weight, a pound and a half. "The female," remarks Mr. Hodgson, "is a fourth smaller than her mate, wants almost wholly the rich vinous tint of the male, and is, generally, more obscurely coloured."

This diversity of colouring of the sexes reminds us of the *Hurrials*: and it may be remarked, that the general tints are not very different from those of *Treron cantillans*. The species inhabits the Himalaya and the Neilgherries; and Capt. Phayre has obtained it in the Ya-ma-dong mountains, which separate Arracan from Pegu. It appears to keep always to a more elevated region than the next species, as near the snow line of the Himalaya; and Mr. Hodgson states that it is "almost solitary" in its habits.

The *Col. badia*, Raffles, *v. capistrata*, Tem., of the Malay countries, would appear to be very closely allied in its colouring, but considerably inferior in size: the two are regarded as distinct by Mr. G. R. Gray.

C. SYLVATICA: *Col. sylvatica*, Tickell, *Journ. As. Soc.* II. 581: *C. ænea* of India, *Auctorum*; but not of Raffles, *Lin. Tr.* XIII. 316. (*Dunkul*, H.; *Pyoon-ma-dee*, Arracan.) Head, neck, and under-parts, pearl-grey, purer on the crown and breast, and tinged elsewhere (and occasionally on the crown) with ruddy-vinaceous: back, wings, rump, and tail, shining coppery-green, with a dash of grey on the large alars, and greenest upon the tail; under tail-coverts, dark maronne: chin, and immediately around the base of the bill, white. "Irides and orbits, lake-red; bill slaty, at base above red, at tip bluish-white; legs lake-red." (Jerdon.) Another observer describes the irides to be "deep pink;" but Capt. Tickell writes—"Eyes, orange; feet, rose-coloured; bill, horny, bluish over the nostrils." Length, eighteen or nineteen inches; expanse, two

feet and a half ; closed wing, nine inches to nine and a half ; and tail, six inches to six and a half : sexes alike.

"This fine species," remarks Mr. Jerdon, "is found in all the lofty forests of the west coast, single or in small parties of three or four. It has a single, low, plaintive note." Capt. Tickell, in his 'List of birds collected in the jungles of Borabhúm and Dholbhúm,' states that it is "common in some parts ; preferring the open and large-timbered tracts. They are wild and difficult of approach, and go generally in small parties of four or five. The voice is deep, and resembles groaning." I have never seen it from the Himalaya ; but it is very abundant in the hill regions of Assam, Sylhet, Tipperah, and Arracan ; also in the Tenasserim provinces ; and the Asiatic Society has received it from Java. A writer in the 'Bengal Sporting Review' (No. II. p. 89,) observes—"The habits of this handsome bird are strictly arboreal ; it is seldom seen but in the depths of the jungle ; is gregarious, like the Hurrials, but is only a cold weather resident in the eastern districts of Bengal, and breeds elsewhere.\* It makes its appearance in November, and leaves towards the end of March. Its favourite food consists of the bijer plum (*Ziziphus jujuba*), and a jungle berry, called by the natives *Anygootah*. When wounded, it evinces more spirit than the *Columbidæ* appear generally to possess ; erecting the feathers of its head and neck, and buffeting with its wings the hand that captures it. The note is harsh, not unlike the croaking of a bull-frog."

There are several closely allied species : *C. ænea*, as figured (*i. e.* the head,) by Mr. G. R. Gray, in his illustrated work on the 'Genera of Birds', has a large round knob at the base of its upper mandible, of which the Indian species never presents the slightest trace ; and a beautiful specimen before me, from Borneo (?), exhibiting this knob, differs also from the Indian species in several other particulars.† Another, from the same region, exactly resembles the Indian species, except in its inferior size, having the wing but eight inches, and the rest in proportion ; this is doubtless the *C. ænea* of Raffles's list, described as "exceeding fifteen inches in length" : so that, in Sumatra, there would appear to be closely allied diminutives of both the Indian species. *C. perspicillata* of Java and the Moluccas also approximates a good deal, but is readily enough distinguishable.

\* Mr. Frith found a nest of this bird in the Garrow hills.

† It seems to be the "Sumatran Pigeon, No. 12," of Latham.

Of the third great genus of fruit-eating pigeons, *Ptilinopus*, also largely developed in the eastern Archipelago and Polynesian Isles, no Indian species has been discovered; the *Pt. Elphinstonii* of Sykes (seemingly) appertaining to the same group of ordinary pigeons as the British Cushat or Ring-dove.

Sub-fam. GOURINÆ, *Ground Pigeons*.

The great series of ground pigeons and ground doves, presents a marked gradation in form and character, from genera allied (excepting in the form of the feet) to the *Carpophagæ* and *Ptilinopodes* of the preceding sub-family, to others which exhibit a nearer relationship to the species of the next sub-family. The size also varies remarkably, as both the largest and smallest pigeons known, are comprised in this group; some attaining the magnitude of a hen-turkey, while others are scarcely bigger than a sparrow. These birds are of a shorter, more full, and grouse-like figure, than that of other pigeons, having the wings more or less rounded, and even bowed or hollowed in some instances; the tarsi comparatively elongated, and the toes long and adapted for ground habits. Some even much resemble partridges in their mode of life: but even these, for the most part, prefer the cover of low brush-wood (as do also many partridges), the haunts of different species varying; and other genera are completely sylvan in their abode, feeding on the ground, more especially on fallen fruits and berries. Such are the magnificent Gouras, or great crowned pigeons (*Goura coronata* and *G. Stoursii*), of the Moluccas and New Guinea, which in their plumage and colouring approximate *Treron cantillans* and *Carpophaga insignis*; and the elegant hackled ground pigeons (*Calenas*), one of which (*C. nicobaricus*) abounds in the forests of the Malay peninsula, and in the Nicobar, Andaman, and Cocos Isles, thus almost verging on the eastern boundary of the territory whose fauna we here treat of. The general resemblance of this bird to *Ptilinopus* is striking in the living specimens of both; and from what I have observed of it in confinement, I have great reason to doubt the current statement that it ever lays more than two eggs, the number so usual in the pigeon family: indeed, I think there is present reason to be sceptical of the statements that any pigeon lays more than that number; though it is certain that several of the *Gourinæ* are clad with down at an early age, and follow their parents

soon after they are hatched. The only Indian species is among the least characteristic of the tribe, so much so, that it requires some knowledge of its various Australian affines to comprehend its classification in the present group. It ranks under

**CHALCOPHAPS**, Gould, (apparently a sylvan sub-genus of *Phaps*, Selby, exemplified by the common Bronze-wing of Australia).

**CH. INDICA** : *Columba indica*, Lin. : *C. pileata*, Scopoli : *C. javanica* (?), *cynocephala*, et *albicapilla*, Gmelin : *C. cyanopileata*, et *griseocapilla*, Bonnaterre : *C. superciliaris*, Wagler. (*Rám-G'hoogoo* and *R'háj-G'hoo-goo*, Bengal ; *Gyo-ngyo*, Arracan.) Back and wings, emerald-green, glossed with aureous ; the feathers distinct and scale-like : neck, breast, and under-parts, vinaceous-brown, paler below, and of a duller hue in the female ; two broad dusky bars, alternating with greyish-white, on the rump : tail, dusky in the male, its outermost and penultimate feathers whitish-grey, with black subterminal band : primaries, dusky : forehead of the male, white, passing as a supercilium over the eye ; the crown of the head, ash-grey : a white bar near the angle of the wing ; and lower tail-coverts, ashy, the longest, brown-black : inside of the wings, reddish cinnamon-brown. The female has a greyish-white forehead, much less developed than in the other sex, and a narrow whitish supercilium ; crown of the head, rufescent ; no white bar at the shoulder of the wing ; the tail tinged with ferruginous ; and the neck and under-parts are browner than in the male. Irides, dark : bare skin around the eyes, deep purplish-carneous, as are also the legs ; and the beak is bright coral-red, except towards the nostrils, where somewhat dusky. Length, ten inches and a quarter, by seventeen and a half : and of wing, five inches and a half to five and three-quarters.

This beautiful ground-dove is common in thick jungly situations, and especially among dense bamboos, throughout the country ; and it is equally abundant in the Malayan Archipelago. A writer before cited, remarks,—“ The rapidity of flight it exhibits, exceeds that of any bird I am acquainted with ; except, perhaps, the brief decisive swoop of some of the smaller *Falconidæ* : as in the progress of the latter, there is no apparent motion of the wings, but gliding along a few feet from the ground, diverging or rising just sufficiently to clear intervening obstacles, the ground dove skims with an arrow-like swiftness, and is come and gone in an instant ; scarcely giving the eye time to detect what has crossed the field of vision. When settled on the ground, however, it shews no

unusual degree of fear, and may be approached near enough to notice its motions and brilliancy of colouring. Bare spots about the roots of large trees, particularly of the tamarind, appear to be favourite resorts; and a pair will be occasionally found sunning themselves, arranging their plumage and scraping up the earth, and beating up the dust with expanded wings, after the manner of the *Rasores*, upon an old *b'heetah*—the artificially raised mound of a deserted village. They soon become reconciled to confinement; and the voice is plaintive and monotonous, like an oft-repeated low tone on a distant flute.\* The nest of this species I have never seen, but am informed that it is built in low thorny trees, and often in bamboo jungle: the eggs are two in number; and one taken from the oviduct (April 30th,) measures just an inch long by three-quarters of an inch across, and is of a less pure white than those of ordinary pigeons and doves.

There is a nearly allied species in Australia, the *Col. chrysochlora*, Wagler, which Mr. G. R. Gray conceives to be the true *Col. javanica* of Gmelin. One character by which it may always be readily distinguished, is the total absence of white on the forehead of both sexes. The rapidity of flight so remarkable in the Indian species, as compared with our other *Columbidæ*, is equally observable in other sub-genera of *Phaps*, which might include even *Peristera* of Swainson.†

#### Sub-fam. COLUMBINÆ.

This consists of the ordinary pigeons and doves, the characters and habits of which are familiar to all. They are mostly arboreal, though

\* “*Columbidæ* of the Eastern Districts.”—‘*Bengal Sporting Review*’, No. IV, 1845.

† A curious pigeon, in the guise of a *Pterocles*, is figured among the drawings prepared under the superintendence of the late Sir Alexander Burnes and Dr. Lord, marked *Fahktuk* (i. e. *Facktah* or dove, *Hind.*), from Cabul, which should be sought for in the Scindian deserts. Total length about a foot, the wing six inches and a half, and tail pointed and *Pterocles*-like, extending nearly two inches beyond the tips of the wings: tarsi and toes, which, though rudely drawn, would appear to be those of an ordinary pigeon, naked, and of a pink colour. Bill dusky, being also apparently that of an ordinary pigeon, and rather slender. General colour light isabelline, with darker margins to the feathers of the mantle and wings; neck, breast and underparts, plain, the breast rufescent, and the belly and lower tail-coverts whitish; the outer tail-feathers would appear to have black tips; irides crimson. Should this hereafter be verified, and constitute (as seems probable) a new genus of *sand-doves*, having the habits of the Gangas or Sand-grouse, it might bear the name *Psammaenas Burnesii*.

many of them feed much on the ground, chiefly on grain and oleaginous seeds ; some of the species also nipping the young sprouts of vegetables. They fall into two principal and nearly allied series, those of the pigeons and the doves ; the latter subdividing into several well marked groups.

Genus *COLUMBA*, Lin. (as restricted). PIGEONS. (*Kubbooter*, H. ; *Paira*, B.)

These are of comparatively large size, and generally more robust in make, with square or subquadrate tail. The Indian species fall into two subgenera, viz.—rock pigeons, and wood pigeons : the former exemplified by the common house pigeon, the latter by the common Cushat of Europe.

ROCK PIGEONS. In these, the tarse is rather longer, and the toes are better adapted for walking on the ground. They rarely, if ever, perch on trees, except under peculiar circumstances, as when a dove-cot of domestic pigeons is placed near a tree, with large and conveniently shaped boughs, in which case the pigeons will commonly resort to the latter to sit and roost, but never to form their nests. In the wild state, it is probable that they never perch at all ; retiring to roost and nestle in caverns and small hollows of rocks or sea-cliffs, in the absence of which they select buildings that offer suitable recesses, breeding in the capitals of pillars, and whatever other convenient nooks they find. Hence, when unmolested, these house pigeons soon become familiarized with man, and require little encouragement to merge into the domestic condition.

*C. INTERMEDIA*, Strickland, *An. and Mag. N. H.* 1844, p. 39 : *C. ænas* of India, *Auctorum* : *C. ænas*, var., from Tartary, Wagler. (*Jalalaya*, H. ; *Parwa*, Mahr. ; *Golah*, of the pigeon-dealers.) (INDIAN ROCK PIGEON.) The common wild blue pigeon of India is most closely allied to the European *C. livia*, but is of rather a deeper slaty-grey, with invariably a deep ash-coloured rump ; whereas *C. livia* has, as constantly, a pure white rump : there appears to be no other distinction between them ; unless it be that the play of colours on the neck is finer in the Indian bird. The same difference in the colour of the rump is observable in the domestic pigeons of the two countries, whenever these tend to assume the normal colouring ; for the tame Indian pigeons are as clearly derived from the wild *C. intermedia*, as those of Europe are from *C. livia*.

Colour slaty-grey, darker on the head, breast, upper and lower tail-coverts, and tail, which last has a blackish terminal band not well

defined; nuchal feathers divergent at their tips, and brightly glossed with changeable green and reddish-purple; two black bars on the wing\*; the primaries tinged with brownish, and the outermost tail-feather having its external web gradually more albescent to the base. Irides, brownish-orange; the lids bluish-white: bill black, with a white mealiness at the tumid base of its upper mandible: and legs reddish-pink. Length, thirteen by twenty-three inches; of wing, eight inches and three-quarters.

Mr. Jerdon rightly remarks—"The blue pigeon abounds all over India, being occasionally found in the more open spaces of jungles, especially in rocky districts, and in the neighbourhood of water-falls; but more generally in the open country, inhabiting walls of villages, pagodas, wells, and any large buildings, and breeding chiefly in old walls." Another observer, writing of it in the eastern districts of Bengal, remarks,—"Large colonies of these birds inhabit every moogur, mhutt†, and mass of ruins in the country, where, in company with the (house)

\* In some specimens, particularly among the semi-domestic, slight dusky streaks occur on the shafts of the lesser wing-coverts, which, in the latter, are often much more developed, spreading across the feathers and spotting the whole wing: such birds much resembling (except in the rump not being white) a race of wild pigeons that are abundantly brought at times to the London markets—all of them shot birds; but the latter have not, in addition, the two black bands on the wing well defined, as seems to be regularly the case with this variety of *C. intermedia*. Moreover, in the English bird, the spotting of the lesser wing-coverts does not occur on the shafts of the feathers, but partly margins each web, excepting near the edge of the wing, where the feathers are unspotted. I suspect that the wild rock pigeons of the south of England are mostly of the kind alluded to, which may be designated *C. affinis*; while those of North Britain, and it would seem of Europe generally, are true *C. livia*.

Here, again, we have three closely allied species, analogous to the three yellow-footed Hurrials, *Treron viridifrons*, *Tr. phænicoptera*, and *Tr. chlorigaster*; and if they are to be regarded as mere varieties of the same, what limits can be assigned to the further variation of wild species? *Col. leuconota* is but a step more removed, and I doubt not would equally merge and blend with the others in a state of domesticity. Equally allied are—*Treron sphenura* and *Tr. cantillans*; *Tr. apicauda* and *Tr. oxyura*; and if we grant also some variation of size, we have *Tr. bicincta* and *Tr. vernans*; *Tr. malabarica* and *Tr. chloroptera*; *Turtur chinensis* and *T. suratensis*; *T. meena* and *T. auritus*; &c. &c., which might be regarded as local varieties of the same, and we might thus go on reducing species *ad infinitum*, with no useful definite result, but to the utter confusion of all discriminative classification. However closely races may resemble, if they present absolute and constant differences, whether of size, proportions, or colouring, and if they manifest no tendency to grade from one to the other, except in cases of obvious intermixture, we are justified in considering them as distinct and separate; and more especially, if each, or either, has a wide range of geographic distribution, without exhibiting any climatal or local variation.

† Rude Hindoo temple.



mynah and (rose-ringed) parroquet, they multiply to a vast extent; and the more so, as being held in religious veneration by some, and in special favour by all natives, their destruction is prevented wherever there exists the power. They are so devoid of timidity, that even in the midst of crowded cities, they will build on the cornices in the open verandahs of inhabited houses. When this takes place in the dwelling of a native, their tenure is secure; as their making such selection is looked upon as a happy omen, and their dismissal as the sure forerunner of evil fortune. Pairs frequently take up their quarters among the domestic pigeons of the dove-cot; indeed, it is not an easy matter to prevent their doing so, and intermingling the breed. In the cold weather, they flock and frequent the paddy-stubble in large numbers.”\* Capt. Hutton informs me that this bird “is found in Affghanistan, where, as in many parts of India, it builds in wells and ruined buildings: the *kazeezes*, or Artesian wells of Affghanistan, are sometimes crowded with them. They occur also in the Doon, and are known as the common blue pigeon. At Mussoorie, I have only seen them in the cultivated fields, low down on the sides of hills, in warm situations.”

Being the original stock of the domestic pigeons of India, some notice of the latter should here be introduced. I have not, however, paid much attention to the several varieties; the more choice of which are, besides, kept chiefly by the Moguls in the Upper Provinces, and it is there that observations should be recorded of them. A chapter is devoted to the rearing of pigeons in the *Ayeen Akbaree*, and a number of breeds or races enumerated; but nothing definite can be understood of their distinguishing characters. The different kinds are chiefly esteemed for performing sundry aerial evolutions, and returning at once from any height at an accustomed signal. But to quote the work cited:—“There are also many other beautiful pigeons, which, although they neither wheel nor tumble in the air, yet perform many pleasing tricks; amongst these are the following,—The *Kowkh*, which seems to say the words *yak-roo*. The *Luckeh* [*fantail*], whose cooing is very agreeable, and he carries his head with astonishing pride and stateliness. The *Lowlun*, who upon being shaken, and then put upon the ground, jumps about with strange convulsive motions.” (This may be seen at any of the Calcutta bird-dealers; shaken two or three times in the hand, and the head more

\* “India Sporting Review,” No. IV, 121.

especially, the poor bird tumbles about in a fit for some seconds, when the owner recovers it by blowing hard in its face. They are chiefly black and white, and bare-legged, with a crested occiput; but present no other marked distinction.) “The *Kehrnee*, who has such amazing affection for his hen, that when he has flown out of [human] sight, if she is exposed in a cage, he instantly drops down upon it: they descend either with both wings spread, or with one open, or else with both shut. The *Ruhteh*, is a pigeon famous for carrying letters: but any pigeon may be taught to do this. The *Neshwaree* ascends in the air till he is out of sight, and remains so [i. e. absent?] for a day or two, after which he alights on the ground. There are also many other kinds that are valuable only on account of their beauty, such as the *Sherazee*,\* the *Shushtree*, the *Shashenu*, the *Jougeeah*, the *Rezehdehn*, the *Muggessee*, the *Komeree*, and the *Gowlah*: the last [or *intermedia* in its natural state] is a wild pigeon, of which, if a few are taken, they are speedily joined by a thousand others of their kind. There are people who obtain a livelihood by sending these pigeons to feed abroad, and making them vomit up the grain, by giving them water strongly impregnated with salt. A pigeon is said to live to the age of thirty years.” \*\*\* Among the kinds commonly bred about Calcutta, are fine *Powters* (*Gulla-p’hoola*†), both feather-legged and bare-legged; *Fantails* (*Luckah*) of indisputable merit, but poor helpless monstrosities, except in the eyes of *connoisseurs*, some of which have at least thirty-six tail-feathers‡; and races with an occipital top-knot (*Nuns*), are common: but I have seen nothing like the variety commonly bred by English *fanciers*, and the races generally are less pure (at least in Lower Bengal), with their peculiarities not so strongly brought out; unless in the instance of the *fantails*, and sometimes *powters*, which are as preposterous caricatures of the wild race, as the most extravagant admirer of Nature’s freaks of the kind could reasonably desire, and as undeniably curious in shewing what domestication can produce.

C. LEUCONOTA, Vigors, *Proc. Zool. Soc.* 1831, p. 22; Gould’s ‘Century,’ pl. LIX. (HOODED ROCK PIGEON.) Size and form of last, the wings a

\* *Sarajoo*, Beng. A large black pigeon, with white rump, quills, and under-parts from the throat; generally, very true to this colouring.

† ‘Swollen throat,’ or, literally, *full gullet* (*gula*.)

‡ While drawing up this notice, I visited the bird bazar, and counted thirty-four feathers in a tail which was obviously imperfect.

trifle longer : cap, comprising the throat and ear-coverts, ashy-black : neck, rump (as in *C. livia*), and the entire under-parts, white, with a faint shade of ashy, except on the rump, deepest on the lower tail-coverts : inter-scapularies, scapularies, and wings, light brownish-grey, purer pale ashy on the medial coverts of the wings ; the primaries dull-blackish towards their tips, the secondaries broadly tipped with dusky, and the tertiaries and their coverts having a subterminal dusky band, and broad greyish tips, producing a series of three short bars, successively smaller to the front, and a trace of a small fourth band anteriorly : tail and its upper coverts ashy-black, the former having a broad greyish-white bar, occupying the third quarter from the base of its middle feathers, and narrowing and curving forward to reach the tip of its outermost feathers. Bill, black : legs, pinkish-red : and irides, yellow. Common on the rocky heights of the Himalaya, inhabiting near the snow line.

According to Capt. Hutton, there are two races, if not species, confounded under *C. leuconota* ; viz.—the true *leuconota*, as figured by Gould, with the white of the *hind-neck* spreading a considerable way down the back, and which (he informs me) is found only “ far in the mountains ;” and another, of which the description wholly corresponds with the Nepal and Darjeeling specimens which have served for the above description, and which Capt. Hutton states—“ inhabits the Doon all the year, but is there called ‘ Hill Pigeon,’ while the other is known to collectors as the ‘ Snow Pigeon.’ The Doon bird flies in small flocks during summer from the hills to the Doon in the morning, and returns to the hills in the evening.” If there be really any difference, however, between the birds adverted to, I suspect it must be merely one of age.

Subgenus *PALUMBUS*, Kaup. WOOD PIGEONS or CUSHATS. These have feet well adapted for perching, and a shorter tarse than in the preceding section, which also is more feathered towards the knee. They nidificate and habitually perch on trees.\*

*C. PALUMBUS*, Lin. (EUROPEAN WOOD PIGEON.) Upper-parts brownish-grey, the head, cheeks, throat, rump, and upper tail-coverts, pure ashy, paler on the lower tail-coverts ; fore-neck and breast vinaceous-ruddy, weaker on the belly, and albescent towards the vent : nape, and sides of

\* It should be remarked, that the European *C. ænas* is completely intermediate to these two groups, in its form, colouring, habits, and nidification : it breeds sometimes in the cavities of trees, sometimes in rabbit-burrows.

the neck and shoulders, glossed with changeable green and reddish-purple, the former predominating above, the latter below; and upon each side of the neck a great patch of subdued white, in general largely developed, very rarely reduced to a mere trace: coverts forming the edge of the wing, and impending the winglet, white, as is also the exterior margin of each primary: tail grey at base, becoming blackish at its tip. Bill orange, with a white mealiness at the tumid base of its upper mandible: feet red: and irides light yellow. Length, seventeen by thirty inches; and wing nine inches and a half.

This well known European species inhabits the north-western Himalaya, as about Simla, and in the Alpine Punjab.

C. (?) *ELPHINSTONII*: *Ptilinopus Elphinstonii*, Sykes, *Proc. Zool. Soc.* 1832, p. 149: a *Carpophaga*, apud G. R. Gray. (NEILGHERRY WOOD PIGEON.) "Upper-parts fuscous-brown; the head, neck, and lower-parts, ashy; nape black, the feathers marked with a white spot at tip; interscapularies ruddy; neck and breast glossed with emerald-green, the rump with ashy; 1st, 2nd, 3rd, 4th, and 5th primaries, having their outer web emarginated. Irides ochre-yellow." Length, fifteen or sixteen inches.

I have had no opportunity of examining this fine species, but from the above description of its plumage, translated from Colonel Sykes's brief Latin definition, I cannot help doubting exceedingly the propriety of arranging it as a *Carpophaga*, and as strongly suspect that the present is its true systematic station. Colonel Sykes describes it to be "a rare bird in the Dukhun, met with only in the dense woods of the ghauts. Not gregarious. Stony fruit found in the stomach. Sexes alike. Flight very rapid. The lateral skin of its toes is very much developed." Mr. Jerdon has only noticed it "in the dense woods on the summit of the Neilgherries, in small parties, or single. It is a retired and wary bird. I found various fruits," he adds, "and small shells, in its stomach."

C. *PULCHRICOLLIS*, Hodgson, (mentioned in Mr. G. R. Gray's catalogue of the specimens of *Columbidæ* in the British Museum). (ASHY WOOD PIGEON.) Considerably smaller than the two preceding species; and general colour dusky-grey, much paler and faintly tinged with lake below, more or less whitish towards the vent, and subdued white on the lower tail-coverts: tail blackish: head, cheeks, and ear-coverts, pure light ashy, passing to whitish on the throat: the sides of the neck and breast,

brightly glossed with the usual changeable green and reddish-purple, the former predominating; and above this the feathers are somewhat rigid, and black at base, with broad isabelline tips, whitish at the end, forming a large patch on each side confluent behind. Corneous portion of the bill, apparently pale yellow: and legs probably pink, but fading to amber in the dry specimen, of which colour are also the claws. Length of wing eight and a half to nine inches. Common in the wooded region of the eastern Himalaya.

C. PUNICEA, Tickell, *Journ. As. Soc.* XI, 462.\* (POMPADOUR WOOD PIGEON.) General colour deep vinaceous-ruddy, weaker below, and most of the feathers margined with glossy changeable green and amethystine-purple, the former colour prevailing on the neck and sides of the breast, the latter elsewhere: whole top of the head, including the occiput, whitish-grey: alars and caudals blackish; the primaries tinged externally with grey: upper and lower tail-coverts nigrescent: bill yellow at tip, its basal half blackish in the dry specimen: "irides, orange with a red outer circle: feet dull lake." Length, about sixteen inches; of wing eight inches; and tail, seven inches.

This handsome pigeon inhabits the hill forests of Central India, also those of Assam, and would appear to be tolerably common in the Island of Ramree, Arracan. I have never seen it from the Himalaya.

C. HODGSONII, Vigors, *Proc. Zool. Soc.* 1832, p. 16: *C. nipalensis*, Hodgson, *Journ. As. Soc.* V, 122.† (SPECKLED WOOD PIGEON.) Above, dark vinaceous-ruddy, with white specks on the medial coverts of the wing: head and upper-part of front of neck cinereous, with a vinous tinge in some specimens: rump, upper and lower tail-coverts, dusky-ash: tail ashy-black; the great alars brownish-dusky, the first three primaries having a slight whitish outer margin in some specimens; and the exterior wing-coverts are greyish: nape, sides of neck, and lower parts, vinaceous-ruddy at base of feathers, margined (more broadly on the side of each feather of the breast) with vinous-grey, which increases in quantity upwards, till the surface of the plumage appears solely of this hue; while the dark vinous tint predominates more and more towards the belly; the red portion of each feather appears thus as an obtusely pointed spot upon those of the breast, and on the feathers of the neck

\* Type of *Alsocomus*, Tickell.

† Type of *Dendrotreron*, Hodgson.

is darker and acutely pointed, being there uniformly edged with the pale ashy margin. Bare orbital space livid : bill, purplish-black : "irides hoary, or grey-white : legs and feet black-green to the front, yellowish elsewhere ; claws clear lively yellow." Length, about fifteen inches, by twenty-five or twenty-six inches in alar expanse ; wing nine inches to nine and a quarter. "Female," according to Mr. Hodgson, "rather less, and differing in having the bluish-grey of the head less pale and clear, and in wanting almost entirely the purplish tinge which adds so much beauty to certain parts of the plumage of the male, as especially the upper part of his back, and the lower part of his belly."

"This elegant species," continues Mr. Hodgson, "is found in the woods of the valley of Nepal. It is very shy, seldom or never entering the cultivated fields for the purpose of feeding, but keeping almost always to the woods, and living upon their produce, in the shape of grass, seeds, or berries." It would seem to be not uncommon near Darjeeling : and Captain Wroughton informs me, that it is also tolerably numerous about Simla and Mussooree, where it frequents the pine forests on the higher mountains, as Whartoo and the vicinity of Kotghur. They are generally seen in flocks of six or seven, which are particularly shy and difficult of approach.

*C. Hodgsonii* is nearly allied to *C. arquatrix* of Southern Africa ; but is at once distinguished from that bird by its blackish bill, by the grey upon its head and neck, and by the reduced development of the nude space surrounding the orbits. Another allied African species, is the *C. guinea*, Lin. (*v. trigonigera* of Wagler).

### The DOVES—

Are generally smaller and more delicately formed, with the tail commonly more or less lengthened and graduated, this latter character attaining a high degree of development in certain groups of them. The nearest approach to the wood pigeons is exhibited by the North American passenger doves (*Ectopistes*, Sw.), which are especially characterized by having a long, much graduated, and sharp-pointed tail, and powerful wings, of which the first two primaries are equal and longest ; they have the true pigeon-like play of colours on the sides of the neck. The African *Æna capensis* has been generally placed near *Ectopistes*, but (so far as can be judged from drawings,) would appear rather to approx-

imate certain of the *Macropygiae* of the Eastern Archipelago, as *M. Reinwardtii*. To the last named group, one Indian species appertains.

**MACROPYGIA**, Swainson : *Coccyzura*, Hodgson. (CUCKOO-DOVES.)

The species of this division are remarkable for their very broad, long, and much graduated, tail, and general Cuckoo-like figure. They chiefly inhabit the great Eastern Archipelago, a single species occurring in the Himalaya, and another in Australia. For the most part, they are confined to rocky upland forests, and subsist much on berries, often descending to the ground to pick up fallen mast and fruits : upon being disturbed, their great broad tail shews to much advantage, as they rise. The species of the Archipelago are very injurious to the pepper and other spice plantations ; and their flesh is highly esteemed for the table, from the fine flavour said to be imparted to it by the various aromatic berries on which they feed.

**M. LEPTOGRAMMICA.** *Col. leptogrammica*, Temminck, *pl. col.* 248 : *Coccyzura tusalia*, Hodgson, *Journ. As. Soc.* XIII, p. 936. (RAYED CUCKOO-DOVE.) Upper-parts dusky, with numerous narrow rufous bars on the mantle, wings, rump, and upper tail-coverts ; tail more obscurely barred in the male : forehead, chin, and throat, whitish, tinged with lake : the occiput, neck, and breast, dull pale vinaceous, glossed (less brightly on the breast) with changeable green and amethystine-purple : lower-parts yellowish-albescent, the under tail-coverts pale buff ; all but the four middle tail-feathers ashy, with a broad black subterminal band ; and above this band, the exterior web of the outermost tail-feather is whitish. Female having the tail barred with narrow rufous cross-lines, like the rest of the upper-parts ; and the fore-neck and breast are similarly rayed with alternate dusky and pale buff. The tail-feathers, more especially of the female, have their inner webs rufous at base. Bill black : cere, orbits, and legs, red. Wings seven and a half to eight inches ; middle tail-feathers the same, the outermost four inches and a half.

The above descriptions are taken from a fine characteristic male and female : considerable variation of plumage occurring, as many specimens are in different degrees intermediate. This bird inhabits the eastern Himalaya, and is common at Darjeeling.

**TURTUR**, Selby. (THE TURTLE-DOVES.) (*G'hoogoo*, Bengal ; *Fachtah*, H. ; *Gya*, Arracan.)

Small and delicately formed tree-pigeons, with the tail moderately graduated, or merely rounded, having always broad grey, or greyish-white, tips to its graduating outer-feathers; neck devoid of iridescent gloss. They feed chiefly on the ground, upon grain, small pulse, and oil-seeds; assemble in small flocks except when breeding, and generally prefer groves and coppices which intersperse the open country, coming much into gardens, where sometimes they may be seen nearly as familiar as domestic pigeons. In such situations they breed abundantly, constructing the slight platform nests common to all arboreal *Columbidæ*; and in warm climates, they have no special season for propagation, but produce alike at all times of the year, the same as domestic pigeons. As compared with the large true wood pigeons, these birds are certainly much more terrene in their habits\*; but they grade towards the wood pigeons in *Turtur picturatus* (*V. Dufresnii*) of the Isle of France, which, however, is a true turtle-dove, having merely a larger bill than its congeners. Their geographical range is confined to the Old World, inclusive of Australia; and the only Australian species (*T. humeralis*) is coloured like the *Geopelia*; which last are indeed but a sub-genus of the present group, consisting of smaller and more slender-formed species, with delicate rayed plumage, and which are confined in their distribution to the Malay countries and Australia.†

**T. RISORIUS:** *Col. risoria*, Lin. (*Kālhāk*, *Kāhālāk*, *Kahalaki*, or *Pánr G'hoogo*, Beng.; *Dhor Fachah*, S. India.) (GREY TURTLE-DOVE.) Uniform light grey-brown; the edge of the wing, and lower tail-coverts, pure ashy, somewhat deeper on the latter; head delicate pale vinous-grey, whiter on the forehead and throat; the nape and under-parts less ashy, and more vinaceous, passing to light greyish towards the vent; a narrow black half-collar on the hind-neck; primaries dusky, with slight whitish margins bordering their tips; and closed tail uniform with the back

\* They resemble the generality of more dove-like *Gourinæ* (as do also the Rock Pigeons), in having the outer toe shorter than the inner; which, accordingly, would indicate a terrene propensity.

† *G. striata* (v. *Col. sinica*, *malaccensis*, *bantamensis*, &c.), common in the Malay countries, appears also to inhabit Mauritius. Living specimens are occasionally brought to Calcutta, where I have kept both it and *T. humeralis*; and being thus familiar with both, I do not agree with Messrs. Gould and G. R. Gray in making a *Geopelia* of the latter. It serves, however, to show the immediate connexion of the two sub-groups.



above, all but its middle feathers successively more distinctly marked with black about the middle, passing into greyish on the basal half, and to white on the terminal, successively more strongly pronounced. Irides crimson; bare orbital skin white; the bill black; and feet dark pinkish-red. Length thirteen inches by twenty or a trifle less; wing six inches and a half, or sometimes rather more.

Common and generally diffused, frequenting hedges and trees in the neighbourhood of cultivation, and even low bush-jungle: it inclines more to be gregarious than the other species. To the eastward, however, it seems to be unknown in Arracan. According to Mr. Strickland, the identical species occurs in Northern Africa; and it is likewise stated to inhabit the south-eastern part of Europe, as Hungary, Turkey, and the Islands of the Lower Danube.\* In Southern Africa, it is replaced by a nearly allied species, the *Col. vinacea*, Gmelin, to which Mr. G. R. Gray refers *T. erythrophrys* of Swainson; while Mr. Strickland identifies the latter with *T. risorius*, and considers *T. semitorquatus* of Swainson to be the *vinacea*."† Mr. Gray, again, does not mention *semitorquatus* of Swainson, but gives *semitorquatus*, Rüppell, as distinct from either. *T. vinaceus* is distinguished from *T. risorius*, by its generally much darker colour, by having the under tail-coverts whitish instead of deep ash, by its much broader black nuchal semi-collar, and by its winglet and primary-coverts being dusky instead of pale ash-grey. It is also rather smaller than the Indian species; in which respect, and in the breadth of the nuchal half-collar, the common tame cream-coloured (or pale buff-backed) doves, which are abundantly bred in captivity both in Europe and in India, agree with the South African, rather than with the wild Indian species. As for Swainson's two alleged species, I can identify neither of them satisfactorily; his figure of *T. erythrophrys*, is evidently faulty in the colouring; but he speaks of "the belly, flanks, vent, and under tail-coverts, as "clear cinereous," which should distinguish it from *T. vinaceus*, while its "broad black semi-collar, margined by a narrow cinereous line," instead of a slight greyish-white one, should equally

\* *Bull. de l'Acad. des Sciences de Saint-Petersburgh*, 1837, No. 46; as quoted in the *Rev. Zool. par la Société Cuvierienne*, 1838, p. 293.

† Vide Strickland, in *An. & Mag. N. H.* 1844, p. 38; Gray's illustrated 'Genera of Birds'; and Swainson's 'Birds of West Africa,' Vol. II., *Nat. Libr.*

separate it from *T. risorius*; again, "the orbits are naked and rich red," which applies to neither of them: his *T. erythrophrys* has the wing seven inches, and his *T. semitorquatus* only five inches and a half; both the Indian and South African species being in this respect intermediate. *T. semitorquatus* has, further, "the belly, vent, thighs, and under tail-coverts, cinereous-white," which agrees sufficiently with some specimens, apparently females, of *T. vinaceus*, the (presumed) males having at least the abdomen scarcely paler than the breast; but "above all, the inner toe is one-twentieth of an inch longer than the outer," whilst "in *erythrophrys*, this proportion is almost reversed, or at least the inner toe is not even equal to the outer." In both the Indian and South African birds, the inner toe is shorter than the outer.

Besides the common cream-coloured domestic race, a small albino variety is frequently bred in cages, in different parts of India, with wing measuring five and a half to six inches; but its form of tail and other proportions are as in *T. risorius* and *T. vinaceus*. This bird is often interbred with the cream-coloured race, producing offspring of intermediate size, and shade of colouring.\* The *coo* of *T. risorius* somewhat resembles the sound *cuckoo*, pronounced slowly, and with a pause between the syllables, the second being much prolonged and at first rolled. It may not unfrequently be heard in moonlight nights.

*T. HUMILIS*: *Col. humilis*, Temminck: *Asiatic Pigeon*, Latham. (*Serotee Fachtah*, Hind.; *Golabee*—or rose-coloured—*G'hoogoo*, *Támá-khūree*—or copper-cup,—and *I'tküiyá*—or brick-coloured—dove, Beng.; *Goodko*—*G'hoogoo*? i. e. dove,—Scinde; *Gyo-leng-bya*, Arracan.) (RED TURTLE-DOVE.) Much smaller and of a less elongated form than the last; and general colour fine vinous-red, weaker below; the head ash-grey, paler towards the forehead, and whitish on the chin; a black half-collar on the nape; the rump and upper tail-coverts dusky-ash; vent and lower tail-coverts white, the former tinged with ashy; middle tail-feathers ash-brown; the rest successively more broadly tipped with white, which spreads up the whole exterior web of the outermost feather, and their basal two-thirds (more or less) blackish; margin of the wing grey for the anterior half; the primaries and

\* The "Jungle Pigeon" of Latham would seem to be merely a domestic variety of this kind.

their coverts dusky, and the secondaries greyish-dusky. Irides dark brown; bill black; and legs purplish-red. Length nine inches and a half; and of wing five and a quarter. Female rather smaller. The young nearly resemble the adults of *T. risorius*, except in their much smaller size, their general darker colour, especially upon the head, and in wholly wanting the vinaceous tinge: in this state of plumage, they doubtless constitute the supposed small race of *T. risorius*, mentioned by Major Franklin.

The Red Turtle-dove is generally diffused over the country, though much less numerously than the grey one. It also keeps more to cover, frequenting groves and high thick hedges. Its coo is short and grunt-like.

*T. SENEGALENSIS*: *Col. senegalensis*, Lin.: *C. cambaiensis*, Gmelin, *C. aegyptiaca*, Latham; *C. maculicollis*, Wagler:—figured, but not well, and much over-coloured, in Denon's Egypt. (*Tortroo Fachtah*, Hind.) (NECKLACED TURTLE-DOVE.) Brown above, the wing-coverts (except towards the scapularies) pure light grey; winglet, primaries and their coverts, dusky, the secondaries tinged with grey; head, upper-part of neck, and breast, pinkish-vinaceous, paling below, and passing to white on the belly and lower tail-coverts; the sides of the neck anteriorly (and meeting imperfectly in front,) adorned with a large patch of furcate feathers, black at base, with a round rufous spot on each tip: in the living bird, these hardly appear at all when the neck is drawn in; and unlike the preceding species, there is no bar or other marking on the nape: tail graduated to the depth of an inch, and its feathers attenuate a little towards their tips; the middle tail-feathers are brown; the rest white for the terminal half or nearly so, and black for the remainder. Irides dark with a white inner circle; bill blackish; and legs lake-red. Length ten inches or ten and a half, by fourteen inches; closed wing five inches.

This delicate little species abounds in most parts of the peninsula, also in Western and Upper India generally, and it inhabits the Rajmehal and Monghyr hills in Bengal; but in Lower Bengal, I have never seen or heard of it wild, nor does it appear to occur in the Himalaya, or in the countries to the eastward. In the peninsula, according to Mr. Jerdon, "it abounds both in low jungles, and near villages and cantonments, being found especially towards the north in every garden,

and frequenting stable-yards, houses, &c." Like *T. risorius*, it is common to India and North Africa; and Mr. Strickland states, that it "inhabits the Turkish burial-grounds at Smyrna and Constantinople, which are dense forests of cypress-trees. It is strictly protected by the Turks, and it was with some difficulty," he adds, "that I could obtain a specimen. It was perhaps originally introduced there by man; but now seems completely naturalized."\* The coo of this species is low, subdued and musical, a dissyllabic sound repeated four or five times successively, and of which its Hindoostanee name *Tortroo* is a sort of imitation.

**T. SURATENSIS:** *Col. suratensis*, Gmelin, founded on *la Tourterelle de Surate* of Sonnerat: *C. tigrina*, Temminck: *C. turtur*, Lin., var., figured in Griffith's 'Animal Kingdom,' VIII. 290. (*Chitroka Fachtah*, Hind.; *Chanral G'hoogoo*, or *Telia G'hoogoo*, Beng.; *Kangskiri*, Bhagulpore; *Chitla*, Upper Provinces; *Lay-byouk*, Arracan.) (SPECKLED TURTLE-DOVE.) Above blackish or dusky; each feather having two pale rufous terminal spots, which latter enlarge, and spread up each side of the feather, upon the wing-coverts, the blackish contracting to a central streak, with broad pale vinaceous lateral borders; edge of the wing light grey; head greyish, tinged with vinaceous, which latter prevails on the breast and under-parts, passing to white on the belly and under tail-coverts; a broad half-collar on the nape, consisting of black feathers divergent at the tips, each tip ending in a small round white spot: tail broad and graduated to the depth of an inch and a half or more, each feather attenuating towards its tip; the middle tail-feather brown, the outermost greyish-white for nearly the terminal half, having the rest black, and the other tail-feathers successively intermediate in their colouring. Irides dark hazel, surrounded by a reddish *schlerotica*; beak dull leaden-black; and legs dark purplish-red. Length twelve inches by sixteen and a half; of wing five inches and three-quarters: female rather less.

A very familiar species, and generally diffused, both throughout India and in the Malay countries; coming very much into gardens, even of large towns. It abounds even more than *T. risorius*, in the vicinity of Cal-

\* *Proc. Zool. Soc.* 1836, p. 100.

cutta, where it inhabits every patch of garden; *T. risorius* keeping generally a little away from houses. Its coo is musical and pleasing. Mr. Jerdon mentions having "seen a nearly albino variety once or twice, of a pinkish-white colour throughout." This species has been erroneously identified with the *T. chinensis* (*Col. chinensis*, Scopoli, vel *C. risoria*, var. B, Latham), founded on *la Touterelle grise de la Chine* of Sonnerat, by whom it is correctly figured. The latter is distinguished by its larger size, having the wing and tail respectively six inches long; by the deep ash-colour, instead of white, of its lower tail-coverts; and especially by having the back and wings plain unspotted dark brown, with merely a slight tinge of grey at the bend of the wing only; the spotting of the nape is precisely similar. This bird inhabits China, and the Society possess a specimen of it from Chusan.

*T. MEENA*: *Col. meena*, Sykes, *Proc. Zool. Soc.* 1830, p. 149: *C. agricola*, Tickell, *Journ. As. Soc.* II, 581; very closely allied to, if not identical with, *C. orientalis*, Lath., founded on *la Tourterelle brune de la Chine* of Sonnerat, which is certainly also *C. gelastis*, Temminck, *pl. col.* 550. (*Kullah Fachtah*, Hind.; *Sám G'hoogoo*, Beng.; *H'hulgah*, of the Mahrattas; *Gyo-pein-doo-ma*, Arracan.) (FOX-COLOURED TURTLE-DOVE). Vinaceous-brown, lighter on the belly; more or less ruddy, ashy, or even duskyish, above; the rump and upper tail-coverts deep grey; vent and lower tail-coverts lighter grey; crown and forehead more or less ashy, passing to whitish towards the bill; throat also whitish in some specimens; on the sides of the neck a patch of black feathers, margined with greyish-white, forming a series of three or four lines of the latter hue; scapularies, and a greater or less proportion of the wing-coverts, black, broadly margined with rufous all round their tips; coverts of the secondaries pale bluish-ash, at least in some specimens; winglet, and primaries with their coverts, dusky, the primaries slightly edged with whitish; tail dusky-ash, its outer feathers successively more broadly tipped with whitish-ash, whiter on the outermost and beneath; irides orange. Length about eleven inches and a half; of wing commonly seven inches.

This bird is also pretty generally diffused throughout India, and occurs upon the Himalaya as a summer visitant, arriving in pairs towards the end of March, as I am informed by Capt. Hutton. Mr. Jerdon

observed it to be tolerably abundant in the forests of Goomsoor, south of Cuttack, associating in flocks of various sizes. It is enumerated by Mr. Elliot, he adds, as found in the Southern Mahratta country; but was not observed by himself in the forest of Malabar. In the Himalaya, and in the eastern countries of Assam, Sylhet, and Arracan, it appears to be plentiful, inhabiting alike the hills and plains; and it is common in the Bengal Soonderbuns. A Javanese specimen is rather large, and very dull-coloured; less vinaceous underneath, with more grey on the head, and less rufous margining the feathers of its mantle, than in any Indian specimen I have seen; nevertheless, the species is probably identical.\* It is nearly allied to *T. auritus*, Ray (*Col. turtur*, Lin.), of Europe, which it resembles in its manners, and in its coo: but is distinguished by its superior size; "orange irides instead of yellow; by the whole head (in some), neck, shoulders, breast and belly, being richer vinaceous; in the back and rump being ash, and vent and lower tail-coverts light cinereous," &c. The specimens of *T. auritus* from India and China, mentioned by Latham, may accordingly be presumed to have been of the present species. Another nearly allied dove would seem to exist in *la Tourterelle cendrée de l'Isle de Luçon* of Sonnerat, upon which are founded *Col. cinerea*, Scopoli, and *C. turtur*, var. C, of Latham. Living specimens of the present species, and of the Grey, Red, and Speckled, Turtle-doves, also of the Ground Dove, and of *Treron phanicoptera* and *Tr. bicincta*, are almost always to be seen for sale at the shops of the Calcutta bird-dealers.

*Memorandum.*—The only known Indian Pigeons now wanting to the Museum of the Asiatic Society, Calcutta, are *Columba Elphinstonii*, and Himalayan specimens of *C. palumbus*; also females of *Treron cantillans*, and of *Carpophaga insignis*; and good specimens of *Col. leuconota* are acceptable, as also of *C. pulchricollis*. Of species that require verification, there remain the *Treron pompadora* of Ceylon, and *Psammenas Burnesii* of the Western Deserts (?). Also *Col. malabarica*, Lath. (*Colombe brame* of Temminck), founded on *la Tourterelle de la côte de Malabar* of Sonnerat. Size of *Turtur risorius*; head, back, and wing, pale ash-grey; the neck and breast weak vinous-grey; belly white; some oval

\* This Javanese bird is certainly *T. orientalis*, (Lath.), and *gelastis*, (Tem.); the former of which names, holds precedence for the species.

black spots on the greater wing-coverts. Tail marked with white as in the other Turtle-doves. Bill, irides, and feet, red. Whether the Indian *Carpophagæ* ever lay more than a single egg in each nest, is also a subject for investigation.

April 4th, 1846.

E. B.

POSTSCRIPT.—Some notes on the Indian *Columbidæ*, with which I have been obligingly favoured by Capt. Tickell, arrived too late to be incorporated in the foregoing paper, but may nevertheless be advantageously appended to it.

“*Treron phænicoptera*. These birds are very common throughout the high stony barren parts of Singbhoom, and in the Mautbhoom district, confining themselves to the hurgoolur and peepul trees. They breed in the thick damp forests to the southward, towards Sumbulpoor, during the rains; at which time not a single specimen is to be found in these parts. The Oorias sell numbers of the young ones, which are taken to Calcutta.\*

“*Tr. biceincta*. I killed a specimen of this bird, some years ago, in Singbhoom, when firing into a flock of the Common Hurrial: and I have more than once remarked, in a flock of the latter, smaller individuals, which I have no doubt were interlopers of this species. It is exceedingly rare here, for I have never obtained another specimen.

“*Tr. sphenurus*. This bird, the *Kookoo-fo* of the Lepchas at Darjeeling, is there exceedingly common, but is not so extensively gregarious as the common Hurrial of the plains. They frequent the highest trees, feeding on their berries, and running along the branches with great agility. The male has a most agreeable note, exactly resembling the music of a pastoral reed or pipe. It breeds in June and July, making a large nest in high trees, deeper than that of the common Doves and Wood Pigeons. Bill, pale livid blue, nearly white at tip, and pale clear cobalt basally. The young resemble the female; and the ruddy tinge of the back and small wing-coverts of the male is not assumed until the second year.†

“*Carpophaga insignis*. Of this fine species, I killed a female (one of a pair, the male of which escaped) at Kursiong, towards the end of the month of June. It is not common. The pair were perched on a small tree on the summit of the hill, feeding on berries, with which the crop of the female was filled. Voice, a deep short groan, repeated—‘*woo-woo-woo*.’ Length of this female seventeen inches, by twenty-seven inches in spread of wing; wing nine inches. Irides pearl-grey: bill, dull lake, with blackish tip; legs dull lake. Back, scapularies, and wing-coverts, full deep vinous ash-grey washed with cupreous, the latter pervading the tips and edges of the feathers.

“*C. sylvatica*. I have found these birds only in one part of my district,—in the jungles bordering on Midnapore. They were in a party of eight or ten, perching on detached trees, in a wide plain of jungle-grass. The notes are deep and ventriloquous.

\* All that I have seen with the Calcutta dealers, were from the neighbourhood, and chiefly adults newly taken with bird-lime.

† I have observed this red to be less developed in some specimens; but still suspect that more or less of it would be obtained at the first moult.—E. B.

By the Oorias it is called *Sona Kubootra* [*i. e.* Golden Pigeon: it is also termed in some parts *Burra* (or great) *Hurrial*.]

“*Chalcophaps indicus*. Common in the deep forests, always in the vicinity of streams; and generally upon the ground, in the shelter of beds of reeds and rank grass. When flushed, it takes a short but exceedingly rapid flight, alighting as abruptly with a sudden plunge into the herbage; so that it is a most difficult bird to shoot. Its favourite food consists of the seeds of the castor-oil plant.

*Columba intermedia*. Exceedingly common in Chota Nagpore, breeding in all the steep lofty rocks of that country.

“*C. punicea*. Length sixteen inches, by two feet spread; wing eight inches and three-quarters. Bill greenish-yellow, with basal half livid. Iris amber-yellow, in an orange-red circle. Legs and feet dull lake. The female is similar to the male, but rather smaller and duller in plumage. This species is not uncommon to the south of Singbhoom, going in small parties of four or five, and always along the banks of rivers, which are shaded by large forest-trees. Up and down these noble avenues, which the green shades of mingling boughs above, and the clear rippling stream below, preserve at all hours and seasons pleasantly cool; these Pigeons fly, rarely taking, when disturbed, to the more open tracts distant from the stream. In January 1842, I killed five specimens on the Bytarnee river in Singbhoom. They were feeding principally on the jamoon. These birds feed chiefly in the morning and again at evening; and during the heat of the day, roost on the uppermost branches of the huge derris trees, common in that country. They are wary and difficult of approach.”

The above excellent contribution from Capt. Tickell, exemplifies exactly what I hope to be favoured with by many other correspondents.—E. B. *May 22nd*, 1846.

*A FOURTEENTH MEMOIR on the Law of Storms in India; being the Bay of Bengal, Ceylon, Malabar Coast, and Arabian Sea Storms of 29th November to 5th December, 1845. By HENRY PIDDINGTON, President of Marine Courts of Enquiry.*

The Storms which are the subjects of this Memoir; are of very considerable interest, for taking their rise so near to the Equator as 7° North latitude, they travel up on the usual WN. Westerly track, crossing the Island of Ceylon, the Southern extremity of India and the Laccadive Archipelago, are finally lost for us, in the Arabian Sea, the last notice we have of them being that of the ship *Monarch*, which met hers in latitude 13½° North, longitude 69° East.

This is the second instance of storms, which have been traced on the North side of the Equator, originating in so low a latitude, the first being



the *Fyzulbarry's*, detailed in my Eleventh Memoir, which had a track to the NNW., while these of our present Memoir have very distinctly one to the WNW. It will be remarked, that these storms appear to take their rise in about the same latitude North, as those in the *Storm tract*, to which I have elsewhere\* alluded, do on the South side of the Equator, and about on the same meridian, but our information is, as yet, too scanty to allow us to draw any inference from this coincidence. A matter of more present importance, is, that it is a track which lies much in the way of our Steamers. It is partly on this account, and partly that I was desirous of recognising by early publication, the kind efforts of the Bombay Chamber of Commerce, which has transmitted to me, through the zealous labours of its Secretary, Mr. Scott, the documents from the West of Cape Comorin: while to Capt. Biden I as usual owe most of those on the East, that I have deferred other labours in hand to investigate it. I must not forget to acknowledge here also the attention of Capt. Twynham, Agent for the Peninsular and Oriental Steam Navigation Company; Capt. Moresby of their Steamer, the *Hindoostan*; Major General Cullen, Resident at Cochin; and Mr. Higgs, Master Attendant of H. M.'s Naval Yard, Trincomallee, for their careful forwarding of all the information they could collect. We have also another novelty in this storm, which is, that of a fine, well appointed Steamer, (the Peninsular and Oriental Navigation Company's Steamer *Hindoostan*,) *steaming through the Western verge of the Vortex*, ! and passing the calm centre with all the changes of the wind, which she *should* have, and with the hurricane so violent as to blow away her boats, &c. I am much indebted to Capt. Moresby for his log observations and barometrical notes, which are of very great interest; for in the execution of his duty, he has also, like Capt. Finck of the *Charles Heddle*, performed a very valuable experiment for our new Science.

I have as usual given the authorities as closely abridged as possible, and finally omitting, for brevity's sake, the comparative table, the various considerations from which the track of the storm has been laid down. The documents begin with the log of the ship *Caledonia*, which had the storm farthest to the Eastward.

\* Horn Book of Storms, p. 7, 2nd Edition.

*Ship CALEDONIA, Captain BURN.*

I have fortunately two abstracts of this ship's Log: fortunately, because in the one there is evidently some grave oversight as to the ship's place, which on the 29th, is made 49', and on the 30th, when she was becalmed at the centre of the hurricane, 68' miles! to the Eastward of the one now printed; which being in Capt. Burn's hand writing, I take to be the correct one. It has also the advantage of having the barometrical observations.

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*Extract from Ship CALEDONIA's Log Book; Bay of Bengal. Reduced to civil time. Forwarded by the Chamber of Commerce, Bombay.*

*Saturday, 29th November, 1845.*—Throughout a moderate breeze, from Southward and SE. with passing squalls, and constant rain. Latitude by account  $6^{\circ} 50'$  North, longitude  $88^{\circ} 30'$  East; barometer 29.70; ship under double-reefed top-sails, and reefed courses, as the weather looked threatening. The two previous days we had much rain, and vivid lightning from the Northward and NW., and a heavy swell the last day from SW.

From noon till midnight, a fresh breeze from South and SSE., with heavy rain at times, swell increasing. Barometer 29.70. Distance run from noon to midnight ninety miles. Course West.

*30th Nov.*—1 A. M. Increasing breeze. Barometer 29.65.

„ 4 A. M. Heavy gale, wind shifting from South to SE. Barometer 29.50.

„ 6 A. M. Increasing gale, wind continually shifting from South to SE., and back again; a very heavy swell from SW. Barometer 29.50.

„ 7 A. M. Wind suddenly shifted to East, and increased to a very heavy gale, which obliged us to cut away the sails we had set, and lay the ship to, with her head to the Southward. Barometer 29.50.

„ 8-30 A. M. Gale at its height. Barometer 29.50.

„ 10 A. M. Gale decreasing, but found the barometer had fallen to 29.40.

30th Nov.—11 A. M. Suddenly fell calm.

„ Noon. Light airs from SW. cloudy appearance all round.  
Barometer (still falling) 29.35, a very heavy swell.  
Latitude by account 7° 0' North, longitude by account  
85° 50' East.

„ From noon till 6 P. M. Light airs from the SW. and SSW.,  
with cloudy weather and a heavy swell. Barometer  
gradually falling.

„ 6-30 P. M. Increasing breeze from the South. Barometer  
29.25.

„ 7-30 P. M. Gale returned with all its former violence, a very  
heavy swell from SW. Barometer 29.20.

„ 10-30 P. M. Barometer commenced rising. Wind South.

1st Dec.—1 A. M. Gale decreasing. Barometer 29.40.

„ 4 A. M. Gale moderating fast, and swell going down, wind  
drawing round from South to SE. Barometer 29.45.

„ 8 A. M. Fresh breeze, a SE. Barometer 29.60.

„ Noon moderate, breeze ESE., with cloudy weather. No  
observation.

The following day we got observations, and found the longitude  
by account correct to a few miles, but the latitude by account was  
fifty miles to the Southward of observation, shewing we had experi-  
enced a strong set to the Northward.

JOHN F. BURN,

Bombay; 9th February, 1846.

Commander, Ship *Caledonia*.

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*Abridged Log of the Ship ALIBI, Captain RHODES, from the Mauritius,  
bound to Vizagapatam. Log reduced to civil time.*

On the 27th November.—The *Alibi* was at noon in latitude 3° 6'  
North, longitude 90° 34' East, with a five knot breeze from the South.

Throughout the 28th.—To noon on that day; when she was in latitude  
6° 9' North, longitude 90° 57' East. She had strong steady South to  
SSE., winds, latterly the weather rather unsettled, but at noon she had  
a lower studding-sail set. P. M. the wind hauling gradually to the

Eastward, and at 6 p. m. it was due East to midnight. Ship running eight knots to the Northward.

29th November.—Wind EbN., and ship running to the North, seven and a half knots, to noon; when latitude by observation  $9^{\circ} 8'$  North, longitude  $91^{\circ} 0'$  East, frequent squalls, and the weather very unsettled. Barometer at 29.45. p. m. hard squalls and sea rising. 6 p. m. wind ENE., at 9, South, and decreasing, but the squalls heavier. Ship always running seven and eight knots to the NNW.

30th.—Midnight and to noon, wind marked NE., increasing again with tremendous heavy squalls, and weather very threatening. At daylight more moderate, and at noon latitude  $11^{\circ} 50'$  North, longitude  $89^{\circ} 32'$  East. Barometer rising a little, and weather clear to the East, but dark and heavy to the Westward. p. m. and to noon on the 1st, strong NE. breezes.

It will be clearly seen on reference to the chart, that this ship ran up between the 28th and 29th to the Eastward of the Caledonia's Storm Circle, which was probably then forming.

*Abridged Log of the Ship JULIANA, Captain W. T. WOODHOUSE, from the Mauritius to Madras. Reduced to civil time. Forwarded by Capt. BIDEN.*

The *Juliana* at noon on the 27th November, was in latitude  $5^{\circ} 9'$  North, longitude  $87^{\circ} 50'$  East, with fresh breezes N. Westerly, threatening weather and thick misty rain, with a high confused sea from ENE. p. m. to midnight, wind N. Westerly to West, with the same weather, and a broken swell from the NE. At 10, wind varying from NNW. to West. Heavy rain all night.

28th November.—Daylight wind had veered to SW., noon moderate with passing showers. Latitude  $7^{\circ} 12'$  North, longitude  $89^{\circ} 3'$  East. p. m. to midnight, gradually increasing to fresh gales; and rain and wind veering from SW. to SSE. at 8 p. m.; at 9 SE., at 10, East; at 12, ENE.

29th.—At 1 a. m. wind NEbE. At daylight "increasing gales." At 8 a. m. NNE. and increasing to noon, when strong gales NNE. and a heavy sea, latitude  $8^{\circ} 54'$  North, longitude  $87^{\circ} 28'$  E.\* At 11 a. m. hove to. p. m. to midnight, gale from NE. with some very heavy gusts, the strongest at 4 p. m. Sea very heavy.

\* *Hawks*, Petrels and other birds alighting, is noted in the log at noon this day.

30th November.—2 A. M. wind ENE. 8 A. M. ESE. Noon latitude  $9^{\circ} 34'$  North, longitude  $86^{\circ} 5'$  East. P. M. moderating. 3 P. M. wind East, at 9 ENE. to midnight, when gale breaking to windward with dark appearance to the SW. and vivid lightning.

1st December.—Moderating. Noon latitude  $10^{\circ} 53'$  North, longitude  $84^{\circ} 53'$  East.

This Ship's barometer was deranged.

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*Abridged Note from the Log of the Ship FRANCES, Captain SHARP, from England (?) to Madras. Reduced to civil time. Forwarded by Captain BIDEN.*

30th November, 1845.—Strong gale with heavy squalls and a high head sea, ship under three double-reefed top-sails, and fore-topmast stay-sail. Wind from WNW. to SW. Latitude by account  $7^{\circ} 42'$  North, longitude by account  $86^{\circ} 9'$  East. P. M. a heavy gale, and a dangerous head sea from North-eastward. P. M. carried away the fore and main-topgallant masts.

1st December.—Strong breeze and cloudy, latitude by account  $9^{\circ} 13'$  North, longitude by account  $85^{\circ} 41'$  East. P. M. more moderate throughout, with rain.

2nd.—Latitude by observation  $11^{\circ} 39'$  North, longitude by observation  $85^{\circ} 50' 15''$  East.

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*Extract from the Log Book of the Ship MORLEY. Forwarded by Captain BIDEN,*

At noon 30th November, then in latitude  $9^{\circ} 50'$  North, longitude  $87^{\circ} 10'$  East, with brisk gales from SSW. The glass commenced to fall, a wild appearance, down royal-yards and all the gear. At 8 P. M. a sudden shift in a tremendous squall from East. At midnight, a severe storm attended with strong gusts, the sea making up in heaps, causing the ship to lurch heavily and endangering the masts. At 8 A. M. 1st December, a heavy storm, wind veering from NNE. to East with heavy rain, ship now lying to under close-reefed main-topsail. Noon a heavy

gale EbN. at midnight, the gale veered to ESE. and became more moderate. Glass down in the height of the gale to 28.90.

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*The following Memorandum of the MORLEY's Barometer, was obtained and forwarded to me, by Captain BIDEN.*

Morley's Barometer at commencement of gale,	..	29.85
Ditto midnight, 30th November,	.. ..	29.30
Ditto ditto, 1st and 2d December, 3 A. M.		28.90
Soon after the strength of the gale, Barometer rose to,		29.40
and suddenly to,	.. ..	29.80

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#### *Ship MYARAM DYARAM.*

Capt. Biden, notes in a letter, that the ship *Myaram Dyaram*, from Manilla to Bombay, put into Galle, having lost boats, cut away anchors, and thrown part of her cargo overboard, in a gale from the Eastward in 9° North and 86° East, and this appears, by a letter from Capt. Faucon of the *Frolic*, to the Secretary of the Bombay Chamber, to have occurred on the 1st December. This vessel is also noticed in a letter from Capt. Twynham, at Point de Galle, as having had the gale *at the same time* as the *Caledonia*, and five feet water in her hold.\* We are thus uncertain as to the date of the worst part of the storm with her. Capt. Faucon states it to have begun on the 28th; the two ships, the *Caledonia* and *Myaram* having left the Straits together.

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*Abridged Log of the Ship JOHN WICKLIFFE, from London to Madras.  
Reduced to civil time. Forwarded by Capt. BIDEN.*

*On the 29th November.*—From noon to midnight, the *John Wickliffe* was running up to the NbE. with a fresh WNW. to Westerly breeze, going from five to eight knots, *with a heavy head sea.*

\* The Captain promised a copy of the log to Capt. Twynham, but left without giving it. Had we not a hundred instances of the kind, we could not believe that, after passing through such peril and loss, men will not take the trouble of desiring any boy or junior officer on board, to copy three days' logs! for those who are trying to teach them how to avoid such misfortunes in future.

*On the 30th November.*—Midnight to noon, the wind is marked between West and NW. and gradually decreasing to two and a half knots. Noon latitude  $5^{\circ} 43'$  North, longitude  $86^{\circ} 15'$  East, with a heavy head sea. P. M. wind West to WSW., at 5, NW., at 7, NEbN., and at 8, calms and variable, till at 9, a light breeze sprung up from the South, veering a little to the West. At midnight, ship going four knots.

*On the 1st December.*—Fine Southerly and SS. Easterly breeze to noon, when barometer marked 29.80, latitude  $7^{\circ} 9'$  North, longitude  $85^{\circ} 42'$  East. The same breeze with cloudy weather to midnight.

*Ship WILLIAM ABRAM's Note from Capt. BIDEN.*

The Ship *William Abram*, on the 30th November in latitude  $4^{\circ} 36'$  North, and longitude  $90^{\circ} 10'$  East, thermometer at  $80^{\circ}$ , and sympiesometer at 29.65, had the wind from noon on the 29th, in light squalls from the NW. and at midnight and towards noon on the 30th, variable from the South, with squalls and heavy rain.

*Peninsular and Oriental Steam Navigation Company's Ship HINDOOSTAN, Capt. MORESBY. From Point de Galle, bound to Madras.*

I am indebted to Capt. Moresby for this very interesting log, which as it details a new experiment of high interest to us, that of a fine, well appointed and ably commanded Steam Ship, steaming through the centre of a hurricane, I have printed at length.

*Log of the Peninsular and Oriental Steam Navigation Company's Steam Ship HINDOOSTAN. From Point de Galle towards Madras.*

H.	Courses.	K.	F.	Winds, &c.	Bar.	Remarks, Monday, Dec. 1st, 1845.
1	NE.	7	4	NNW.	..	A. M. Fresh breeze and cloudy.
2	..	7	4	..	..	At 2, Sounded, 6 fathoms. At 2,
3	NNE.	7	4			latitude by Canopus $6^{\circ} 27'$ North. At
4	NbW.	7	4			4, sounded in 60 fathoms, no ground.
5	..	7	4			At 5-30, saw the land to the NW.
6	ENE.	7	4			At 6, saw the Basses right a head, distant
7	NNE.	7	4			about 2 miles, hauled out to ENE. At
8	..	7	4			6-20, sounded, no bottom at 70 fathoms
9	..	7	4			when Saddle hill bore NNW., Chimney
10	..	7	4			hill NW $\frac{1}{2}$ W. and the middle of the
11	NbE.	7	4	} Ther.	29.71	Basses NbW. At 8, cloudy weather;
12	..	7	4		76°	visited ship—squally appearances. At
						11, hard rain; noon hard squall of wind
						and rain, with thick uncomfortable
						weather. Found we have experienced
						a current of 46 miles against us.

*Distance Steamed. Longitude Chronometer. Latitude Observation.*

Various courses, 140 miles.

82° 10' East.

6° 50' North.

1	NbE.	7	..	North.	Bar.
2	..	7	..	..	29.69
3	North.	7			
4	..	7			
5	NbE.	7			
6	..	6	..	..	29.64
7	..	6	..	..	29.60
8	..	5	..	..	29.50
9	NNE.	5	..	North.	29.00
10	NE.	5	..	..	29.00
11	..	3	..	..	28.90
12	NNE.	3	..	{ N. E. } mid- night.	28.90

P. M. Hard squalls from Northward with heavy rain. At 3, passed a small Brig standing to the Southward. At 5, hands employed lashing and securing every thing on deck and below. Carpenters screwing the ports and gangways in. At 8, fresh gale and heavy constant rain. Well, 2½ inches. 11-30, strong gale with a heavy swell from NE. shipping a great quantity of water, put fresh gaskets on all the sails. Midnight, shipped a sea in the saloon through the stern ports.

H.	Courses.	K.	F.	Winds, &c.	Bar.	Remarks, Tuesday, Dec. 2nd, 1845.
1	East.	3	..	East.	28.90	A. M. Wind lulled suddenly and shifted round to the Southward, and blew a perfect hurricane, veering gradually to the S. Eastward. At 1, running before the wind and sea, the starboard jolly boat's davit broke, the boat hanging only by the port tackle and stopper, cut it a drift as it was beating heavy against the stern. At 1-20, the starboard cutter was lifted by the wind and thrown up on the top of the awning stanchions, and its own davits, secured it as well as possible.
2	North.	5	..	SW. to S.	28.90	
3	East.	2	..	{ SW. to } { SSE. }	29.00	
4	North.	5	..	..	29.25	
5	NbW.	6	..	SE.	29.40	
6	..	6	..	..	29.54	
7	..	6	4	..	29.61	
8	..	6	4	..	29.62	
9	..	7	..	..	29.62	
10	NNW.	7	..	ESE.	29.62	
11	..	7	4	..	29.64	
12	..	7	4	..	29.64	

*Distance Steamed. Longitude. Well at 2 A. M. 3 inches. Lat. Observation.*

Various 140 miles. Long. by act. 82° 20' East. No observation Lat. by act. 8° 41' N.

1	{ NNW. } ½ W.	8	..	SE.	29.74	At 2, the chocks of the fore yard carried away, secured the yard with fresh lashing. At 4, strong gale with a heavy following sea, wind veering from South to SE. Carpenters with seamen securing and nailing the skylights, &c. At daylight got the starboard cutter in board and secured, she is almost knocked to pieces. At 8, moderating. At 9, squally, noon squally with rain. Carpenters fitting dead-lights, opening ports, &c. At 4, strong breeze and cloudy rain. At 8, squally from NE. visited ship and found all right. Midnight, wind variable from the SE.
2	..	8				
3	..	8	4			
4	..	8	4			
5	..	8	4	East.		
6	..	8	4	..	29.80	
7	NNW.	8	4			
8	..	8	4			
9	..	8	4			
10	..	8	4			
11	..	8	4			
12	..	8	4	SE.	29.80	



H.	Courses.	K.	F.	Winds, &c.		Remarks, Wednesday, Dec. 3rd, 1845.
1	NNW.	8	4	NE. to SE.	Well.	A. M. Moderate, wind with a heavy SE. swell.
2	..	8	4			
3	..	8	4	..	..	At 2, lat. by Canopus $10^{\circ} 25'$ North.
4	..	8	4	..	Dry.	At 2, ditto, Sirins, $10^{\circ} 24'$ North.
5	..	8	4	East.	..	Daylight thick hazy weather. At
6	..	8	4			8, moderate weather.
7	..	8	4			
8	..	8	4	..	Dry.	
9	..	8	4			
10	..	8	4	ESE.		
11	..	8	4			
12	..	8	4			

Captain Moresby remarks in a letter to me, that "during the first part of the hurricane, the atmosphere felt very close and warm."

#### *Ship FRANCES.*

Captain Biden has furnished me with an extract from the log of the ship Frances, from Colombo to Madras, which vessel was on the 29th November, in  $6^{\circ} 4'$  North, and on the 2nd December in  $11^{\circ} 39'$ , but has no intervening observations or latitude by account given. She was probably, Capt. Biden says, about sixty miles from the Ceylon shore. She evidently ran up just before the storm reached that meridian, having had strong SE. and Easterly gales on the 1st and 2nd.

#### *Ship CARNATIC, bound to Bombay. From the Bombay Chamber of Commerce.*

This ship was standing in to sight Cape Comorin, and at noon on the 1st December was in latitude  $4^{\circ} 25'$  North, longitude by chronometer  $78^{\circ} 43'$  East, her barometer 29.70, sympiesometer 29.50, and thermometer  $84^{\circ}$ , with a moderate breeze from the North, cloudy, light rain, and a heavy head swell. By midnight the wind had veered to the Westward, (I suppose about NW.?)

2nd December.—Daylight increasing North Westerly breeze, latitude at noon  $5^{\circ} 21'$  North, longitude  $79^{\circ} 33'$  East, barometer 29.66, sympiesometer 29.16, thermometer  $81^{\circ}$ . P. M. Fresh breeze from the Westward, and unsettled weather with a confused sea. At 8 P. M. to midnight. The same wind at SW.

*At noon on the 3d.*—Latitude  $6^{\circ} 46'$  North, longitude  $78^{\circ} 29'$  East, barometer 29.80, sympiesometer 29.20, thermometer  $84^{\circ}$ .

*Ship BOLTON, Capt. T. DAVIDSON. From the Bombay Chamber of Commerce.*

This ship was also like the *Carnatic*, standing in to sight Cape Comorin, and the abstract from her log is given in a tabular form, which I print below. It appears that like the *Carnatic*, she just felt the South-western quadrant of the storm, which was wrecking the *Florist* at Tuticoreen in its passage over the Peninsula.

*Extract from the Log of the Ship BOLTON.*

Dates.	Latitude.	Longitude.	Barometer.	Thermometer.	Wind.	Remarks.
1st Dec.	$4^{\circ} 40' N.$	$77^{\circ} 37' E.$	29.90	83	NNE.	{ Fresh winds and cloudy. Ship 43 miles West of account.
2nd „	5 50	77 24	29.80	84	W. to NW.	{ First part light airs, latter part heavy squalls of wind and rain, weather very unsettled.
3rd „	7 17	77 10	29.60	83	W. to N.	{ First severe squalls with torrents of rain, latter part calm.
4th „	7 8	77 42	29.80	82	Calms.	{ Found the current to have set these last 24 hours S. $50^{\circ}$ E., 42 miles.

*Ceylon and the Southern part of the Peninsula of India.*

We now take the data which relate to the passage of the storm over Ceylon and the Southern extremity of India. These are mostly but detached notes, but will enable us to trace the vortex pretty accurately; as to time at least, to the Malabar Coast. It will be recollected that we had the log of the *Hindoostan* Steamer off the Eastern Coast of Ceylon, steaming through the Eastern verge of the centre, a little after midnight of the 1st and 2nd, being then about thirty miles from the shore, and to the ESE. of Baticolo.

*Captain BIDEN, Master Attendant of Madras, says:—*

“The Master of the War Steamer *Spiteful* says, it blew hard at Trincomallee on the 1st, from East and SE. Several trees were blown

down, but the fury of the gale was to the Southward, and what is very remarkable, is, that although the strength of the hurricane was about the *Hindoostan's* position, yet a vessel arrived at Trincomallee that was off the Basses on the 1st, and she was perfectly becalmed, yet the Ceylon paper states, that it blew hard at Point de Galle. The Master could not tell me the range of the *Spiteful's* barometer. However, the reports I send you, shew that this gale extended from several degrees East of Ceylon, across that Island to Tuticoreen, Tinevelly, and Ootacamund on the Neilgherries, and to Quilon on the Malabar Coast, where I suspect it was confined within a narrow compass, in a North and South direction. It was squally off Calicut, but was scarcely felt at Tellicherry. The H. C. Sloop of War *Coote*, struck on the reef off Calicut on the 1st, and the foul weather on the 3rd broke her up.

"We were apprehensive of bad weather here, as the surf was high with a turbulent sea, heavy clouds all gathering in the SE. and as a ship came in from the Northward on the 2nd and experienced very fine weather, and our Steamer the *Hindoostan* had not arrived, I was clearly of opinion, that she had encountered a gale to the Southward, and so it proved to be the case. We had very threatening weather on the 16th, I prepared the shipping by signal to "prepare to slip and put to sea." Barometer fell from  $30^{\circ}$  to  $29^{\circ} 88'$ , however, although the clouds portended wind and rain, we had but little of either. On the 25th and 26th, barometer ranging from  $30^{\circ} 10'$  to  $30^{\circ} 18'$ , we had the heaviest fall of rain we have experienced this year, and serious alarms are happily relieved by that providential downfall, but how are we to account for such a dense atmosphere, and so much rain, without the mercury indicating so great a change? The sympiesometer also rose a day or two before, and continued steady—there was but little wind throughout, the weather was close and the thermometer higher than usual at this season, viz. from  $78^{\circ}$  to  $82^{\circ}$ .

"A large ship under jury masts was seen off Trincomalee on the 19th instant. Capt. Maitland steamed out of the harbour at daylight, on the following day intending to offer assistance, but the stranger was out of sight, and the *Spiteful* having but few coals, and *none in store at Trincomallee!* Capt. Maitland was reluctantly compelled to put back. The ship *Robert Small*, homeward bound, sailed from these roads on Saturday evening the 29th, and must I think, have run right into the

heart of the gale, as she started with a fresh NE. wind. However, she is ably commanded and well managed."

*Capt. BIDEN in an additional note adds*—"Capt. Maitland, H. M. Steam Vessel *Spiteful*, reports that the gale was severe at Trincomallee on the 1st instant, and that a complete hurricane raged at Baticolo and to the Southward. Ceylon papers of the 13th instant, report, that the gale though brief, was very severe at Point de Galle on the night of the 1st, and during the 2nd instant.

"The ship *Caledonia* from Singapore to Bombay, has also put in at Galle, having lost top-gallant masts, top-sails and fore-sail, and quarter boats, and thrown part of her cargo overboard, in a heavy gale from South, SE. and East, on the 30th ultimo, in latitude 7° North, and longitude 88° East.

"At Tuticoreen the ship *Florist*, loading for China, was wrecked on the night of the 2nd instant, on a reef off Tuticoreen.

"The gale was violent at Quilon on the night of the 2nd instant, and at A. M. of the 3rd instant several *Dhonies* were driven on shore, and beat to pieces. The *Charles Forbes* encountered the gale off Anjengo, and the time verified by her log may be considered as more correct than that which is reported from Quilon.

"The hurricane raged with great violence at Tinevelly and at Ootacamund, but I have not been able to obtain the ranges of the barometer."

C. BIDEN.

*From Mr. HIGGS, Master Attendant of Trincomallee.*

I have the following register of the weather from the 30th November to the 3rd December, but have altered the letters which designate the weather to words, as the former are not generally understood.

Mr. Higgs, says in his letter to me, "during the night of the 1st and morning of the 2nd instant from Trincomallee on the road to Kandy in a SE. direction, a vast number of large trees were blown down so as to obstruct the road, and at Habboneme, fifty miles distant, the travellers' bungalow was blown down; there has not been a settled gale of wind at Trincomallee for the last eleven years, but we have frequently had in the months of November and December, a heavy swell rolling in from the NE, when there have been gales in the Bay of Bengal.

H.	Barometer in Inches and Decimals.	Thermometer.	Winds.		Weather.	Rain. Inches.	30th November, 1845. Remarks.
			Quarter.	Strength.			
2							
4							
6	29.79	78	NE.	5	..	..	Cloudy and blue sky.
8	29.80	81	..	5			
10	29.82	79	NNE.	5	..	..	Overcast and squally.
12	29.82	82	NE.	5	..	..	Cloudy and blue sky.
2	29.76	82	..	5	..	..	A high sea from the Eastward.
4	29.76	81	..	5			
6	29.76	80	..	5	..	..	Overcast.
8							
10							
12							

H.	Barometer in Inches and Decimals.	Thermometer.	Winds.		Weather.	Rain. Inches.	1st December, 1845. Remarks.
			Quarter.	Strength.			
2	..	..	NE.	6	..	..	Overcast and squally.
4	..	..	..	6			
6	29.76	76	..	7	..	..	A very high sea in the offing (from East.)
8	29.76	77	..	5	..	..	Rain in showers.
10	29.78	77	..	5			
12	29.74	79	..	5	..		Blue sky and cloudy.
2	29.70	78	NEbN.	6			
3	29.68	76	..	7	..	..	Violent gusts with rain.
4	29.68	76	NE.	6	..	..	Rain.
6	29.68	76	..	6			
8	29.68	76	..	6			
10	29.68	76	ENE.	6			
12							

H.	Barometer in Inches and Decimals.	Thermometer.	Winds.		Weather.	Rain. Inches.	2nd December, 1845. Remarks.
			Quarter.	Strength.			
2	..	..	East.	9	..	..	Most violent gusts with rain.
4	..	..	..	8			
6	29.66	76	ESE.	7			
8	29.68	78	..	7	..	..	Many trees blown down and large branches strewed around. The beach covered with fish at daylight. A very high sea from the East rolling in.
9	29.70	79	..	0	..	..	
10	29.71	79	SE.	6			
12	29.71	77	..	6	..	..	Gloomy weather.
2	29.68	78	East.	6	..	..	Hazy.
4	29.68	78	..	6			
6	29.70	77	..	4			
8	29.72	76	SE.	3			
10							
12							

H.	Barometer in Inches and Decimals.	Thermometer.	Winds.		Weather.	Rain. Inches.	3rd December, 1845. Remarks.
			Quarter.	Strength.			
2							
4							
6	29.77	75	SW.	1	..	..	Clearer.
8	29.82	77	..	0	..	..	Smooth Sea.
10	29.86	79	NNE.	1	..	Be.	Overcast and squally.
12	29.84	81	..	2			
2	29.80	82	..	3			
4	29.79	81	NE.	3	..	..	Up to the 10th we had light variable winds, on that day at noon, a steady NE. wind set in, which continues. Trincomallee 15th Dec. 1845.
6	29.79	80	..	0			
8	..	..	SE.	4			
10	..	..	..	3			
12							

*Baticolo and Tuticoreen.*

From the *Colombo Observer* of the 15th and 18th, I collect the following notices of the storm at the above named places, the notice of the 18th is a well written letter, evidently by a careful observer at Baticolo, and I have used the other notices only to supply a few words.

*Batticaloa*.\*—This place was visited by a most fearful hurricane on the night of the 1st instant. The day had been very wet and stormy with squalls from the NE., but this was considered as no more than the usual monsoon. However, about midnight, it began to blow with great fury from the NW., or along the coast, with heavy rain. About half-past 2 A. M. of the 2nd, the wind shifted round to the opposite quarter, and after a short but ominous lull, blew with truly terrific violence from the South and SE., occasioning wide spread, and almost universal, destruction of trees and native houses, and even of bungalows. The roaring and hollow *moaning*† (as noticed by many) of the hurricane, the incessant dash of the rain, and a complication of other noises, were most dismal, but in fact even the crash of thousands of falling trees could not be distinctly *heard*, though it must have added to the general uproar. No body could say if it thundered, *but a great light* was observed at one period of the storm, which probably was caused by some electric explosion. The hurricane did not extend to the country at the most Southern extremity of the lake of Batticaloa.

*Tuticoreen*.—The effects of the gale are thus described in a letter dated the 4th instant (December.) The gale commenced about 8 P. M. (the date is not given, but in the paper of the 15th, the *Florist* is said to have been lost on the night of the 2nd,) and raged with unremitting fury till 3 A. M., after which it abated, and about sunrise there was a comparative calm. The wind was from SE. accompanied with torrents of rain. During the night the ship *Florist*, of 538 tons, was driven on shore.

*For the following observations from Palamcottah, Cochin, Trevandrum, Quilon and Alleppy*, I am indebted to Major General Cullen.

\* This is no doubt the correct spelling, but Horsburgh, and all the charts use Baticolo, which I have therefore preferred.

† I have noticed this before (VIIth and XIth Memoirs, and Horn Book of Storms,) there is no doubt that it does occur in hurricanes very frequently. Is it an electric phenomenon, analogous to the remarkable rumbling which proceeds a hail storm in India, and often in Europe?

*Meteorological Observations at Palamcottah. By Conductor THOMAS DARLING of the Ordnance.*

1845.	Hour.	Barometer.	Thermometer.			Hour.	Barometer.	Thermometer.			Fall of Rain.	Remarks.
			Attached.	Maximum.	Wet Bulb.			Attached.	Maximum.	Wet Bulb.		
December, 1	9 A. M.	29.916	79 $\frac{1}{2}$	78 $\frac{1}{2}$	71	4 P. M.	29.796	85 $\frac{1}{2}$	85	73	..	Clear and dry: gentle Northerly breeze.
" 2	"	.880	78	79	71	"	..	..	..	72	..	Dark haze with a slight drizzling rain now and then during the day. Wind blowing fresh from N.E., at 4 P. M., with heavy rain. At 11 P. M. A violent gale from the East, by which all the oldest and largest trees were uprooted and laid prostrate. At Midnight. Very violent, the wind veering to the SE. accompanied with heavy rain until about 1 $\frac{1}{2}$ A. M., when the hurricane abated. 6 A. M. Clear and fair, with a fresh breeze from the SE.
" 3	"	.866	79 $\frac{1}{2}$	78	75	"	.800	85	84 $\frac{1}{2}$	78	..	Northwards clear: fresh breeze from SE.
" 4	"	.954	80	79	75	"	.842	85	84	76	..	Clear: wind fresh from Southward, evening.
" 5	"	.874	80 $\frac{1}{2}$	78	75	"	.764	85 $\frac{3}{4}$	85	76	..	Clear, light, cool N. wind: evening fresh from SE.



*Register of the Barometer at Cochin, during the Gale of the 3rd December, 1845.*

Date.	Time.	Bar.	Ther.	Dew point by Daniell.	Remarks.
1845.			°		
Nov. 29	9 $\frac{1}{2}$ A. M.	30.232	81	64	Generally dry Easterly winds, as shewn by the dew point.
" 30	9 $\frac{1}{2}$ "	.190	81 $\frac{1}{2}$	65	
Dec. 1	9 $\frac{1}{2}$ "	.200	80 $\frac{1}{2}$	64	
" 2	9 $\frac{1}{2}$ "	.144	81	67	
" 3	4 $\frac{1}{2}$ "	.050	81 $\frac{1}{2}$	67	Violent gale from NE.
" 3	6 $\frac{1}{2}$ "	29.980	77	×	Ditto ditto, increasing.
" 3	6 $\frac{3}{4}$ "	.964	76	72	Slightly moderated and more Easterly.
" 3	7 "	.980	76	×	Moderating, EbS.
" 3	7 $\frac{1}{4}$ "	30.000	77	×	Strong gale with occasional violent gusts East and SE.
" 3	7 $\frac{1}{2}$ "	.012	77	×	Wind moderate ditto ditto E. & SE.
" 3	7 $\frac{3}{4}$ "	.026	77	×	Breeze moderate ditto ditto SE. & S.
" 3	8 "	.050	77	×	Strong wind again ditto ditto SE.
" 3	8 $\frac{1}{4}$ "	.058	77	×	Ditto ditto with heavy rain from SE.
" 3	8 $\frac{1}{2}$ "	.070	77	×	Moderate breeze ditto ditto SE.
" 3	8 $\frac{3}{4}$ "	.114	77	×	Rather strong ditto ditto SE. & S.
" 3	9 "	.130	77	74	Moderate breeze SSE. Ditto ditto Southerly and SWesterly. Ditto ditto Southerly and SWesterly.
" 3	9 $\frac{1}{4}$ "	.142	77	×	
" 3	10 "	.154	77	×	
" 3	10 $\frac{1}{2}$ "	.158	77	×	
" 3	11 "	.160	78	×	Breeze Southerly.
" 3	12 "	.160	79	×	
" 3	1 P. M.	30.164	79	×	
" 3	2 $\frac{1}{2}$ "	.130	79	×	
" 3	4 "	.130	79	74	
" 4	9 $\frac{1}{2}$ A. M.	.286	81	68	
" 5	" "	.218	82	70	
" 6	9 $\frac{1}{2}$ A. M.	.170	80	73	
" 7	" "	.224	82	76	

About one inch of rain fell from midnight on the 2nd to noon on the 3rd.

*Barometer at Trevandrum.*

Date.	Time.	Bar.	Ther.	Remarks.
1845.			°	
November, 29	9 $\frac{1}{2}$ A. M.	29.930	82	Three inches of rain.
" 30	" "	.864	82	
December, 1	" "	.844	81 $\frac{1}{2}$	
" 2	" "	.960	82	
" 3	" "	.990	80	
" 4	" "	.928	83	
" 5	" "	.854	81	
" 6	" "	.822	81 $\frac{1}{2}$	
" 7	" "	.874	82	

*At Trevandrum.*—It appears to have blown very strong, at 1 A. M. of the 3rd a violent gale from 2 $\frac{1}{2}$  to 3; abated from 3 to 3 $\frac{1}{2}$ : when it recommenced with greater violence, than ever, and continued till about day-break.

*At Quilon.*—The Master Attendant writes that—"The gale commenced at 10 P. M. of the 2nd, and continued till 7 A. M. of the 3rd."

*At Alleppy.*—The Master Attendant writes—"A gale of wind with some rain commenced at this place about midnight on the 2nd, which continued till daylight on the 3rd, when it blew a perfect hurricane."

*At Cannanore.*—A correspondent writes—"The gale on the 3rd commenced here as far as I can remember, about 8 A. M., and lasted till about 1 P. M. At first from NE. and East, and latterly from SE. and SSW. Hardly any rain fell."

*Remarks on board the Ship FAIZE ROHABANNY, THOMAS STEWART, Commander. From the Bombay Chamber of Commerce. Reduced to civil time.*

*December 2nd.*—Light SE. breezes and cloudy.—Midnight. Squally; wind veered to the Eastward, in twenty-six fathoms off Cadiapatam Point. Barometer 29·95.—P. M. Wind WNW., a fresh breeze, and cloudy, with constant rain.—Sunset. Barometer 29·80: dark cloudy weather: wind increasing to a gale.—At 9 P. M. Barometer 29·70: strong gale from the SW.: a high confused sea: lying to under close-reefed main-topsail: thirty-three to thirty-five fathoms.—Midnight. Violent squalls from the Westward with heavy rain, lightning from the Eastward. Barometer 29·50.

*3rd.*—At 3 A. M. Barometer 29·45: the wind veered round to the Southward.—Noon. Calm and sultry weather: off Cape Comorin: twenty-nine fathoms. Barometer 30·5.—P. M. Wind NNE.: light breeze and clear weather.

*4th.*—Noon. Cape Comorin NE.: after which fine weather.

*Abstract of the Log of the Ship CHARLES FORBES, Captain WILLS; from China bound to Bombay. Civil time. From the Bombay Chamber of Commerce.*

*December 1st 1845.*—A. M. Light Northerly and NNEasterly airs and hazy weather.—Noon. Winds ENEasterly: Latitude 7° 52' North:

forty-six fathoms water.—P. M. Winds light and veering to the Southward and South-westward.—Midnight. Light NWesterly winds and fine weather.

2nd.—A. M. Light Northerly and NEasterly winds and fine weather.—Noon. Winds variable and light; Latitude  $8^{\circ} 48'$  North; twenty-six fathoms.—P. M. Calms with occasional light variable airs.—Sunset. Wind NW. and increasing; the weather very unsettled; heavy clouds hanging over the land with lightning.—At 8. Light breeze and cloudy, with rain; tacked off shore.—At 9. Increasing breeze with squalls: Barometer 29.80: Sympiesometer 29.20.—At 10. Hard squalls with a heavy swell: Barometer 29.75: Sympiesometer 29.12.—At 11. Wind NNW. and increasing, and sea rising.—Midnight. Blowing a perfect gale NW., and high sea. Barometer 29.62: Sympiesometer 28.90.

3rd.—A. M. Hard gale with severe squalls, and high sea.—At 2. Hard weather with thick heavy rain: Barometer 29.56: Sympiesometer 28.86.—At 4. Wind veering to WNW. and Westward: the topsails blown from the bolt ropes, leaving the ship under bare poles, the sea running very high: Barometer 29.50: Sympiesometer 28.78.—Daylight. The wind veering to the South-westward. Wore ship and set the mainsail; ship labouring much in the high confused sea, the rain ceasing.—At 7. The wind lulling at times, and weather clearing over the land, but a very high confused sea; the ship pitching and labouring much, in which we carried away flying-jib-boom, spritsail yard and dolphin-striker, and stove in the jolly boat, hanging at our stern: Barometer 29.70: Sympiesometer 29.0.—At 8. Wind decreasing at SSW.: enabled to bend new sails, and to set the fore-topmast staysail, and storm mizen, to steady the ship: Barometer 29.86: Sympiesometer 29.16.—At Noon. Weather much more moderate with less sea. Latitude  $8^{\circ} 58'$  North; in forty-one fathoms water.—P. M. Decreasing SWesterly, and Southerly breeze, and fine weather.—Sunset. Light Southerly breeze and fine: Barometer 29.86: Sympiesometer 28.20.\*—Midnight. Land breeze, light and variable.

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*Ships along the Malabar Coast, and Magnetic Storm at Bombay.*

By the zealous care of Mr. Scott, Secretary to the Bombay Chamber of Commerce, I have been furnished with several logs of ships along the

\* The Sympiesometer is always 0.50 to 0.60, below the Barometer.

coast, shewing how they were just on the Northern range of the storm on the 2nd, 3rd, and 4th December: the 2nd and 3rd being, it will be recollected as above, the day of the *Charles Forbes'* storm, and the 3rd of that of *Cananore*, in latitude  $11^{\circ} 52\frac{1}{2}'$  North. I note these for brevity's sake, in separate paragraphs.

The *Recovery*, Capt. Johnson, on the 2nd at noon, was in latitude  $12^{\circ} 29'$  North; in forty-one fathoms water. Her barometer, a French one, at twenty-seven inches eleven lines, (equal to  $29\cdot76$  English) having fallen to this, from twenty-eight inches one line, French ( $29\cdot94$  English.) From the 1st, during the day, had the land and sea breezes, but at midnight it was dark and cloudy.

*December 3rd.*—Dark cloudy and variable.—Noon. Strong wind with heavy head sea from the NW. Latitude  $12^{\circ} 57'$  North; in forty-one fathoms water, wind NE. Barometer twenty-seven inches ten lines French ( $29\cdot67$  English) and in a note from Capt. Johnson says, “ usually on the coast at this season, twenty-eight inches two lines, French ( $30\cdot03$  English).—At 3 P. M. A sudden squall with change of wind to the SSE. and very threatening appearance; by midnight, clear again.

*4th.*—1 A. M. Fresh breezes, cloudy, and heavy following sea from the SW. which continued to noon, when in latitude  $14^{\circ} 53'$ , North; and forty-five fathoms water; strong SSW. sea. No barometer marked this day.

*5th.*—Dark cloudy and unsettled, but light winds with strong swell from the SW. and a cloudy wild appearance. Latitude  $16^{\circ} 40'$ ; in forty-one fathoms. Barometer twenty-seven inches ten lines, ( $29\cdot66$  English.)

*Ship Charlotte.*—Her Commander says in his note. From the 1st to the 4th instant. Land and sea breezes prevailed with hot sultry weather during the day, and cloudy with heavy dews during the night. On the morning of the 4th, the wind freshened up at North and continued freshening till noon, when it veered round to the NE. Sacrifice Rock then bearing NbE $\frac{1}{2}$ E; distant about six miles (latitude about  $11^{\circ} 24'$  North) in soundings of from sixteen to seventeen fathoms.—At 3 P. M. The wind increased to a fresh gale at East, running before it under our topsails; the clouds dark and disordered, going from East to SE.—At 6 P. M.—The wind moderated to a fresh steady breeze,

made all sail, running along the land in soundings of nineteen to twenty-two fathoms. At 10 at night, the wind wore to the SE. and continued a steady breeze at South to SE. all next day. The 5th when at noon St. George's Island, bore  $\text{NNE}\frac{1}{2}\text{East}$ . Latitude observation  $15^{\circ} 11'$  North; distance off shore about ten miles; the weather moderating, but very hazy: the barometer and thermometer showed no symptoms of any change during the strength of the breezes: the latter part of the 5th decreasing winds with cloudy weather, with a cross turbulent sea.

*Barque* MARCHIONESS OF DOUGLAS.

Had fine weather from the 2nd instant; latitude  $14^{\circ} 14'$  North, longitude  $73^{\circ} 34'$  East, to the 4th instant in latitude  $15^{\circ} 43'$  North, longitude  $73^{\circ} 27'$  East. The winds moderate and light from NE. to NNW. and latterly SE.

*Ship* EARL OF CLARE.

Fine, land and sea breezes, from the 2nd instant; latitude  $14^{\circ} 38'$ , to the 4th instant,  $16^{\circ} 17'$  North, while passing the Coast.

BOMBAY.

*The recent Magnetic Disturbance.*

The *Hurkaru*, in copying the letter we received sometime ago from Professor Orlebar, describing this phenomenon, makes the following observations, which we commend to the notice of the learned Professor himself, and all others interested in Meteorology.

' "We extract from the *Bombay Courier* a letter from Professor Orlebar, in charge of the Observatory at Bombay, descriptive of a remarkable magnetic disturbance,—'a magnetic storm,' which was indicated by the apparatus under his care, on the morning of the 3rd instant. The Professor remarks that "it will probably appear that this week has been accompanied with remarkable phenomena on every quarter of the earth." May not this unusual disturbance of the magnetic fluid have been in some way connected with the rotatory hurricane which was experienced by the *Hindoostan* off Ceylon, on the 1st and 2nd instant, and which, travelling to the NW. might have been sufficiently near Bombay on the 3rd to produce the phenomena observed by Professor Orlebar?"'—*Bombay Courier*; December 30th.

*Ship JOHN BROWN, R. BROWN, Commander. From the Bombay Chamber of Commerce.*

From the log of this vessel, of which the track will be seen on the chart, it appears that on the 3rd and 4th December, she was running in to the ENE. ; towards, and in the passage between, the head of the Maldives and the Southern Laccadives, and that on the 4th at noon when with the *Charles Forbes*, the weather had quite moderated to fine, the *John Brown* was within a few miles on the same parallel of latitude as the *Forbes* on the 3rd, but about 170 miles West of her position, in longitude  $73^{\circ} 29'$  East with steady breezes and gloomy weather, the wind about SW. and a heavy sea, which they supposed to be caused by a current setting to the ENE. Her barometer (probably too low) was at  $28\cdot80$  ; the thermometer  $87^{\circ}$ .

*Abridged Log of the Ship MARY ANNE, Captain ALLEN, from London to Bombay. Reduced to civil time. From the Bombay Chamber of Commerce.*

*At Noon 5th December, 1845.*—Increasing breezes NNW. with a heavy head sea : Latitude  $8^{\circ} 7'$  North : Longitude  $71^{\circ} 15'$  East : Barometer  $29\cdot45$  : Sympiesometer  $29\cdot30$  : Thermometer  $83\frac{1}{2}^{\circ}$ .—Towards midnight decreasing and cloudy.

*6th.*—A. M. WSW., increasing to noon, when Latitude  $9^{\circ} 54'$  North : Longitude  $71^{\circ} 16'$  East : Barometer  $29\cdot40$  : Sympiesometer  $29\cdot26$  : Thermometer  $82^{\circ}$  : heavy confused sea from the Northward.—P. M. Wind West.—At 7, Southerly, rapid scud, much lightning and sea.—At 5 P. M. barometer fell to  $29\cdot35$ , and sympiesometer to  $26\cdot24$ .

*7th.*—Noon fine weather : Latitude  $12^{\circ} 54'$  North : Longitude  $11^{\circ} 0'$  East : Barometer  $29\cdot50$  : Sympiesometer  $29\cdot36$  : Thermometer  $83\frac{1}{2}^{\circ}$ . After which fine weather and calms.

*Abstract of the Log of the Ship RAJASTHAN, Captain STEWART, from London bound to Bombay. Reduced to civil time. From the Bombay Chamber of Commerce.*

*On the 4th December, 1845.*—*Rajasthan* was at noon in Latitude  $9^{\circ} 55'$  North : Longitude  $69^{\circ} 0'$  East : Barometer  $29\cdot85$  : Sympiesometer  $29\cdot42$  : Thermometer  $83^{\circ} 3'$ .—A. M. Freshening to steady ; fresh wind from the

NN. Westward with a head swell, studding sails set, noon increasing and heavy head sea from NNE. and clear weather. 4 P. M. Observed the Barometer to fall suddenly to 29·70: Sympiesometer 29·32: wind increasing; in small sails. At Midnight. Fresh gales and cloudy.

*5th December.*—6 A. M. Split fore and main-topsails: wind rapidly increasing to a hard gale NW., and sea much agitated, rising in pyramids\* and breaking frequently on the ship, hove to on the larboard tack, under mizen and fore-topmast staysails. Noon. Latitude 11° 42' North: Longitude 71° 5' East. Barometer, noon 29·85, 4 P. M. 29·70. Sympiesometer, noon 29·42, 4 P. M. 29·32. At 0·30. P. M. Wind *shifted* to WSW. tremendous sea running, and ship labouring violently. At 4 P. M. A heavy gust with rain, when the violence of the wind abated during the night, the wind rising in heavy gusts, with intervals of calm, a dark cloudy sky and drizzling rain.

*6th.*—4 A. M. Wind *shifted* to SE. and barometer “on the turn.”† At 6. Fresh gales with passing squalls: made sail and bore away NNE., weather clearing up and sea rapidly going down. At 8. Single-reefed topsails. Noon. Latitude 12° 32' North: Longitude 71° 43'. Barometer, noon 29·70, 4 P. M. 29·60. Sympiesometer, noon 29·32, 4 P. M. 29·22. P. M. Steady breezes and showery, after which fine weather.

*Captain STEWART has further obliged me with the following very instructive Remarks.*

“1. On the evening of the 4th December, I observed a remarkable kind of lightning to N. Westward, shooting up perpendicularly from the horizon in stalks, or columns, of two and three, at short distances; it was not at all bright, but rather of a dullish glare.‡

“2. My barometer fell lowest on Saturday, after the greatest violence of the wind from NW. and SW. was past, which led me to expect that

\* A remarkable instance, but which doubtless often occurs without being noted, of the pyramidal sea beginning very early in a gale: I account for it by supposing the NN. Easterly sea crossed and broken by the N. Westerly gale.

† It appears by this expression to have been lower than 29·70, between 4 P. M. of the 5th and 4 A. M. of the 6th, but is not, unfortunately, registered.

‡ This is almost, word for word, Capt. Rundle's description of this remarkable kind of lightning. See 11th Memoir, Journal Asiatic Society, Vol. XIV, p. 71, where I have also quoted another instance of it. We might almost term it “Typhoon lightning!”

when it shifted to South or SE., I should have the height of the gale; on the contrary, there was both less wind and sea.

"3. I consider that when I hove to at 6 A. M. of the 5th, with the wind at NW. or NWbW., the centre of the storm was NE. of my position, and passing to WN. Westward, so that by running on, I should have got into worse weather; and this is confirmed by the fact, that the ship *Monarch* a day's sail ahead, experienced the extreme violence of the hurricane.

"4. With the exception of the singular lightning already mentioned, there was not a single flash, and the sky had more the appearance of a gale in the higher latitudes than a tropical storm, the scud passing swiftly in the direction of the wind with clear patches between, excepting the night of the 6th, when it was dark and lowering, with drizzling rain.

"5. The position of the vessel was correctly ascertained by observation, and the dates are all nautical time."\*

RATH. STEWART,  
*Com. Ship Rajasthan.*

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*Abstract from the Journal of Captain McFARLANE, of the American Barque STAR. Reduced to civil time. From the Bombay Chamber of Commerce.*

"*Thursday 4th December, 1845.*—A fresh breeze at NWbN. and cloudy. Latitude observation  $8^{\circ} 41'$ : Longitude by chronometer  $66^{\circ} 43'$  E.: Thermometer  $81^{\circ}$ : fresh breezes at NWbN., and passing clouds. Through the night, a strong breeze at N. Westward.

"*5th.*—Noon, A. M. Strong gales at NWbN. and hazy. All this day we have had a heavy swell from NW., the vessel pitching violently. At 10 A. M. took in the top-gallant sails. Current setting to Southward and Eastward fifteen miles in twenty-four hours. Latitude observation  $10^{\circ} 41'$ : Longitude by chronometer  $68^{\circ} 39'$ : Thermometer  $81^{\circ}$ . First part of this day had strong breezes at NW., and quick passing clouds. At 6 P. M. Double-reefed the topsails; a heavy sea from NNW.: through the night strong gales from NW. to North, with heavy squalls and thick, cloudy, rainy weather.

\* Altered by me to correspond with the other logs.—H. P.



"6th.—At 8 A. M. Wind NNE., more moderate; wore ship to Northward and Westward and made sail. Latitude observation  $12^{\circ} 6'$ ; Longitude by chronometer  $71^{\circ} 24'$ ; Thermometer  $76^{\circ}$ . At meridian the NW. point of Cherbaniani Bank or Reef, bore  $ENE\frac{1}{4}N.$ , fifty-five miles distant. The course and distance for this day's run was  $NEbE\frac{1}{2}E$ . 180 miles distance, whereas the course and distance by dead reckoning was North  $33^{\circ}$  East, 135 miles, which would make the current setting  $EbS\frac{1}{2}S$ . ninety-five miles! I was prepared to find a good deal of Easterly current here, but did not expect any thing like this. The very heavy swell we have had, which has caused the vessel to pitch and strain very much, has arisen no doubt from this cause. Since we have got into the vicinity of these (Laccadive) Islands, we have had a very thick heavy mist, it being a mere chance that I was enabled to get observations, the sun appearing but a very short time. P. M. Strong breezes at  $EbN$ . and thick hazy weather: a large irregular swell. Through the night fresh gales and cloudy.

"7th.—Fresh breezes at  $ENE$ . and a confused irregular swell. From my observations this day, it would appear that there was some mistake in yesterday's work, otherwise we have had as much Westerly current this day, as we experienced yesterday in the opposite direction. Latitude observation  $14^{\circ} 55'$ ; Longitude by chronometer  $69^{\circ} 52'$ ; Thermometer  $79^{\circ}$ ."

WILLIAM MCFARLANE,

*Master of American Barque Star.*

*Memorandum and Notes from Capt. DUNCANSON, Ship MONARCH. From the Bombay Chamber of Commerce.*

1845.	Lat. N.	Long. E.	Adie's Symp.	Remarks.
Dec. 1st	$11^{\circ} 56'$	$68^{\circ} 14'$	29.58	Fine clear weather.
„ 2nd	$11^{\circ} 55'$	$69^{\circ} 5'$	29.50	{ Strong monsoon with a very cross sea.
„ 3rd	$12^{\circ} 16'$	$70^{\circ} 29'$	29.42	

At 10 P. M. Squally, and wind variable from the Northward, a dark cloud rose to the Eastward, which rapidly spread overhead, with vivid lightning and loud thunder, with a very threatening appearance. Sym-piesometer fell to 29.30, and now beginning to blow hard; proceeded to get the ship under bare poles as fast as possible.

*4th Dec.*—Gale continued increasing till 1 A. M., on the 4th, when it blew a complete hurricane. Sympiesometer down to 28·90. The star-board cutter (a twenty-five feet boat) was blown from the davits, and the ship laid with her lee rail under water. At 8 A. M. A little more moderate, but a tremendous sea running; the wind gradually veering round from NNE., where it began, to Southward. At noon it commenced with redoubled violence, being then in latitude by account  $13^{\circ} 40'$  North and longitude  $69^{\circ} 6'$  East, and veered to WSW., then backed round to NE., blowing furiously all the time till 8 A. M., on the 5th, when we set some sail, having been lying to with a tarpaulin in the mizen rigging, for thirty-two hours previous. The sympiesometer began to rise about 5 A. M., and at noon was at 29·31, then in latitude  $13^{\circ} 20'$  North, and longitude  $70^{\circ} 20'$  East by account.

*6th.*—Strong breezes from NE. with hard squalls, veering to SE. with much rain, and a most cross, heavy sea. Latitude  $13^{\circ} 50'$  North: longitude  $70^{\circ} 3'$  East: Sympiesometer 29·47. Experienced a current of forty miles to the Westward.

JOHN DUNCANSON,  
*Commander of Ship Monarch.*

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*Ship EUPHRATES.*

The ship *Euphrates* Capt. Gifford, was on the 3rd December at noon in latitude  $14^{\circ} 35'$  North: longitude  $69^{\circ} 58'$  East, with a strong breeze NNE. and clear weather, becoming cloudy with lightning to the Southward: at midnight, she was standing in towards the Coast.

*4th Dec.*—At 3 A. M. The wind *shifted* suddenly in a hard squall to East with a threatening appearance. Barometer 29·85; the winds variable from the Eastward till noon, when a heavy head sea, (from the NE. to North.) Latitude at noon  $15^{\circ} 16'$ : longitude  $71^{\circ} 28'$  East. After this time the weather was fine, the barometer gradually rising as the ship stood to the Northward.

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SUMMARY.

We have now to consider the data we have for laying down the track of the storms as I have marked them on the chart.

Our first log to the Eastward is that of the *Caledonia*, which at noon on the 29th, was in latitude  $6^{\circ} 50'$  North : longitude  $88^{\circ} 30'$  East.\* By midnight the weather was decidedly threatening, and the swell from the SW. increasing, the barometer having fallen to 29.70, with a fresh breeze from South to SSE., going about seven and seven and a half knots. We may fairly then assume, that she was now on the Eastern border of the vortex, and taking the average wind at SbE., that it bore WbS. of her. It will be noted that the *Alibi* was running up between the 28th and 29th to the Northward across the *Caledonia's* track, and experienced no bad weather, though traces of the stormy action may be found in her remarks.

The *Juliana* on the 27th, seems evidently running up into the South-western quadrant of a Storm Circle, (or into a *segment* of the forming vortex?) which by daylight of the 28th, had passed onwards, and was veering and hauling gradually, like the broken *streams* of wind, of which I have, in former Memoirs, supposed the existence, to SW. and to SSE., SE. and Easterly, when it became another, and a different storm, from the *Caledonia's*, as we shall presently shew.

To estimate the centre on this day, the 29th, we have but its bearing from the *Caledonia*. Its distance from her to the Westward I estimate as follows :—

We find that on the 30th, the *Caledonia* was at the true calm centre of her hurricane in latitude  $7^{\circ} 0'$ , longitude  $85^{\circ} 50'$ ; and that a little after midnight between the 1st and 2nd, say at 1 P. M. of the 2nd, the *Hindoostan* Steamer also, doubtless steaming through the centre of her hurricane. Taking the *Caledonia's* hurricane and the *Hindoostan's* to be the same; this is from noon 30th to 1 A. M. of the 2nd, thirty-seven hours, and the distance between the positions is 218 miles, which gives 5.9 miles an hour for the rate of travelling of the vortex, or 141.5 miles per day. Now we find that the *Caledonia* in the twenty-four hours from noon of the 29th, to noon of the 30th, had made 160 miles of run, of which ninety miles were run from noon to midnight, and by 7 A. M. she was obliged to lie to, and at 10, was on the verge of the calm centre, in which at 11, she was fairly involved; or say she had made the

\* Her position on the 28th, is marked from the memorandum before alluded to. Nothing being said of the weather from noon 28th, to noon 29th, I presume it was fine, and the track shews how the ship was running towards the hurricane.

remaining seventy miles in ten hours, allowing a little for the storm wave ? the total rate of her run would then be 160 miles in twenty-two hours, or say, 7.3 miles per hour, or 1.4 miles faster than the vortex was moving before her.

If we assume the hurricane to have moved at this rate above mentioned, 5.9 miles per hour, it follows that the ship in the twenty-two hours that she was chasing it, only gained upon it at this rate of 1.4 miles per hour, which would give her distance at noon on the 29th, to have been really only thirty miles from the centre ! and yet with only a double-reefed topsail breeze.

This would give but sixty miles of diameter, but though we have had, it is true, instances of hurricanes which like this have not much exceeded, as far as we could judge, sixty miles in diameter, yet I am inclined to allow it somewhat more than this, and we must therefore suppose, either that it was not completely formed at noon of the 29th, though the *Caledonia's* barometer (29.70) would indicate that it was enough so to produce the usual barometric depression, or that it was at a greater distance and moving at a slower rate.

We have no sort of indication to guide us in this estimate, so that I have, as a mere matter of choice and probability, placed the centre this day at fifty miles WbS. from the *Caledonia's* position, which gives it 100 miles of diameter. It could not have been much more, for we shall see that on the 30th, when she was *within* the calm centre, the *John Wickliffe*, at eighty-two miles to the SbE. of her, was barely experiencing the remote effects of the swell, in pitching away her flying jib-boom, while her wind, though Westerly, was declining to calm. The *John Wickliffe*, as she ran up, must have crossed, at about 8 A. M., on the 1st, the place of the centre a little before noon of the 30th. We find that the heavy head sea is again noted, P. M., but not at midnight, perhaps this is an omission in copying, or of a careless officer ? It would have been of interest to have found traces of the confused sea of the centre at the very place of it, as we have done in other instances.

The storm had not formed and moved onward at the same rate on the 28th, for then, as will be seen by measuring backwards on the chart, the *Alibi* would have had very different weather. We shall find in our examination of the *Hindoostan's* log for the day in which she *steamed through* the hurricane, that its diameter then (on the 1st and

2nd,) close to the coast of Ceylon, did not certainly much exceed 120 or 130 miles.

On the 30th, we have the *Caledonia* in the centre, which we must therefore place at her position for this day. It is curious to remark that though the vortex was certainly moving on at the rate of 5.9 miles per hour, as we know from the time when it was crossed by the *Hindoostan*, yet the *Caledonia* seems to have lain from 11 A. M. to 6 P. M. in the calm! so that either she was carried along with the centre? or the calm space was from thirty to forty miles in diameter, and she was by the baffling SW. and Southerly winds carried round and round in it?\*

It will be seen that while the longitude was found to agree with the account, it was the latitude which differed fifty miles from the observations when obtained. If the ship had been carried along by the vortex for the seven hours, this must have been detected by the error in longitude. It would be a curious fact to find a storm of not more than 100 miles in diameter with a calm space of thirty miles! so as to make the zone of hurricane surrounding it only thirty-five miles in breadth. There is some countenance given to the idea that there really was a state of things approaching to this, from the fact that during the-calm interval Capt. Burn, though evidently most attentive to his barometer, &c. only calls the sea "a very heavy swell." If the calm centre had been of the usual limited extent he would certainly have had somewhat of the dangerous confused pyramidal sea so often adverted to, and so well known to every sailor who has been through a China Sea Typhoon,† that he never afterwards forgets to name it. The extent of the calm also accounts for the little sea found by the *John Wickliffe*. If these conjectures be correct, we have here a new class of circular storms which we might call Zonal, or Annulars, storms. And I venture to propose a name for them so early, merely for the purpose of calling attention to this singular peculiarity. The note in my Thirteenth Memoir, at p. 716, where Mr. Rechendorf describes the dust whirlwinds as a mere wall or zone of dust, will readily occur to those who have followed the subject. Mr. Thom speaking of the great storms of the

\* Though these ought simply to have carried her to the Northern side of the calm centre: Northerly and even variable winds are not spoken of; perhaps an omission? for the log is seldom correctly kept in such weather.

† The *Caledonia* is a Bombay and China trader of 1000 tons, and Captain Burn, I have no doubt, has been in more than one Typhoon.

Southern Indian Ocean, p. 201, says that "in the early stages it is probable the *calm* is very extensive and embraces several vortexes, which gradually merge into one," but it will be noted that we have here a "calm" of one-third of the whole space of the storm.

The centre for the 1st of December, we can only place by calculation, as to its probable position, between noon 30th, with the *Caledonia*, and 1 A. M., on the 2nd with the *Hindoostan* as calculated at p. 907, and assuming it to have travelled in a straight line. It would seem that the vortex expanded about this time, since it reached the *Hindoostan*, and being deflected or flattened, no doubt, by the high mountains of Ceylon, was with her not a NN.Westerly wind, which a true circle would require, but a Northerly wind which the coast hills would naturally produce. The warmth noted by Capt. Moresby, was probably the effect of the heated shores. At 1 A. M. on the 2nd, the *Hindoostan* was *at* the centre and *steaming* through the Eastern side of it! This ship's experiment, and I do not recollect that such a one has been performed before, gives us tolerable data for one important determination, which is the whole diameter of the vortex. The diameter of the calm space we cannot deduce from it, because she evidently steamed not through the middle, but through the Eastern edge of the calm centre.

If she had been far enough from the Ceylon shore for us to consider the Storm Circle as quite uninfluenced by the high land, our deductions would no doubt be more accurate. I have already noted that I make the storm arrows on the chart to form an oval and wavy, to represent this effect of the mountains, and that I consider the warm winds as coming from the heated shore, and that it is owing to this deflection that the *Hindoostan* had the wind North instead of N.Westerly, as she should, and probably would, have had it in the open sea.

We may consider her as entering upon the verge of the storm, at noon of the 1st when her barometer is at 29.71, and the gale seems fairly to have begun. From this time to noon the next day the log marks 135 miles of run, but the true distance is 110, which proportion we must use to calculate the distance run to 1 A. M. on the 2nd, when the wind "lulled suddenly, and shifted round to the Southward, and blew a perfect hurricane from the SE." Her run up to this time, then, is by log, seventy-one miles, but the correction above noted being the proportion of 135 : 110 :: 71 : 58, reduces it to fifty-eight miles, which

we must take as the nearest approximation to the semi-diameter of the (somewhat flattened?) vortex, or 116 miles for the diameter; which agrees well with what we estimated it to be from the *Caledonia's* log. We further see by Capt. Biden's note, the extract from the *Colombo Observer*, and Mr. Higgs' valuable register, that while the centre was passing over Baticolo at about half-past two in the morning, (the calm focus there seems to have been quite small in extent,) it was blowing from the East in "most violent gusts," at Trincomalee, which is about sixty miles in a NNW. direction from Baticolo, which gives 120 miles of diameter for it on shore.

The Baticolo description remarks, indeed, that "*the hurricane*" did not extend to the country about the South extremity of the lake, which extends about twenty miles from the flag-staff; but by this phrase, the writer probably means that, although there was a gale, yet it was not as at Baticolo, a *hurricane*, levelling every thing before it. Places situated towards the Southern half of a Storm Circle, where it infringes upon high land, and comes straight in from the sea, *should* also be partially sheltered; while those on the Northern side (Trincomalee in this case), should feel its full force; because, if we follow the wind in its circuit, we shall see that the outer zones of it to the North-west, must be impeded by the high land. A centre at Baticolo giving a strong gale at Trincomalee, would extend sixty miles inland to the Westward, over a perfectly flat country; but the first mountain ranges of considerable elevation, certainly approach within twenty-five or thirty miles of the coast. I have endeavoured to mark this effect on the chart by the Baticolo circle of wind-arrows, making them wavy and broken as they skirt and turn off from the mountain ranges; noting, however, that this is merely to express my views of the *probability* of what took place.

The calm at the Basses is also accounted for by their being so completely sheltered and by their distance from the centre. The gales at Colombo are described as being, "brief though severe." They were possibly streams of wind forcing their way through defiles of the mountains? for the vortex if it continued entire above, must have been much divided and broken up below, and probably indeed "lifted up" by the very high land in the interior of Ceylon.

The Trincomalee report from Mr. Higgs requires some farther notice, its barometrical register giving it especially a high value. We find that

it had increased to "violent gusts" from NEbN,\* the barometer being at 29·68, the strength of the wind being as 7.; and that at 2 P. M. there were "*most violent gusts*," the strength of the wind being 9., and the barometer still between 29·68 and 29·66, at which it stood at 6 A. M. It might no doubt have been found lower in this interval if observed, and it was at half-past two that the centre was passing over Baticolo.

*Centre of the 2nd December.*—We have now to follow the storm and assign a place for the centre on the 2nd December, bearing in mind that from Baticolo to Tuticoreen Roads is, in a straight line, 222 miles, with the high land of Ceylon between them. The centre passed Baticolo on the 2nd, at 2½ A. M., and the *Florist* seems to have been wrecked in Tuticoreen Roads only about ten, or at most twelve hours later, that is in the night between the 2nd and 3rd. Hence this could scarcely be the same storm which had passed Baticolo, for if so, it must have, all at once, travelled at the rate of nearly eighteen miles an hour; and this notwithstanding the obstacles which the chain of Ceylon mountains must have presented. I am inclined then rather to suppose that this storm, which at or about midnight, 2nd and 3rd, was SE. at Tuticoreen; Westerly with the *Faize Rubahny*, between Cadiapatam Point and Cape Comorin; NW. with the *Charles Forbes*; a gale at Trevandrum, Quilon, Alleppy, Tinnevely, and Ootacamund (no direction of the wind is given in the notes from these places); a "very violent gale" at East and SE. at Palamcottah; a "violent gale" at NE. on the morning of the 3rd at Cochin; and NE. and East, veering to SE. and SSW. at Cananore, at 8 A. M. to 1 P. M. on the 3rd. I am inclined to think then, that this storm was a new one, generated very possibly by the atmospheric disturbance to the East of Ceylon. The circle which I have marked on the chart then between Palamcotta and the *Faize Rubahny*, may be supposed to be the *average* position of the centre of a new storm, at midnight between the 2nd and 3rd, as far as any place can be assigned to it with uncertain data, and in a mountainous country.†

By noon of the 3rd, we find the *Charles Forbes* with the wind, which had rapidly veered with her since midnight, S. Westerly with nearly fine weather. At Cochin at noon it was Southerly and S. Westerly, and

\* Advancing to the North beyond Baticolo, the high land trends farther inland to the West, so that the coast being lower, less interruption was given to the vortex.

† See postscript.



it was moderating from SE. and SSW. ; so that we may take it at this time to have been clear of the coast, and assuming that it extended from the *Forbes'* position at midnight, to near Cananore, it was now a storm of 240 miles in diameter; but this could not be the case, for whatever the Cananore gale\* was owing to the wind was S.Westerly, at daylight on the 3rd with the *Charles Forbes*, and N.Easterly at Cochin, and had left the *Faize Rubahny*; shewing that this vortex was of small extent, and that its centre lay between the *Forbes* and Cochin. I shall afterwards shew that the Cananore storm was probably that of the *Juliana*, *Frances*, and *Morley*.

The logs of the ships *John Brown* and *Mary Anne*, which were to the Westward of, and between the Maldives and Laccadives, give us no traces of the *Charles Forbes'* storm on the 4th and 5th, except in a heavy swell felt by the *John Brown*; so that it may have broken up or exhausted itself in the tract between the coast and these Islands, or have travelled on to the positions of the *Rajasthan* and *Monarch*, on the 5th and 6th, which we shall afterwards consider.

We must now return to the Bay of Bengal again, to take up the storm experienced by the *Juliana*, *Morley*, *Myaram Dyaram*, and *Frances*, as having precedence in order of time.

We noted p. 905 that the *Alibi* in running up across the *Caledonia's* track, and nearly due North, between the meridians of 89 and 90°, experienced no bad weather, though some traces of the stormy action might be found in her log. It would appear that she had on the 29th in latitude 9° 8' North, heavy squalls and sea from EbN. and ENE. to South, and again to NE. after midnight, but nothing that could be called a severe gale, though her barometer was low, and she saw that the weather was threatening to the Westward on the 30th, when she was in about 12° North.

The *Juliana* clearly ran into a circular storm, having the winds first varying from NNW. to West, then to SW. and moderating for a time (which so frequently occurs) towards noon on the 28th, when she was always running on to the NW. She crossed the track of her storm behind or to the Eastward of its centre, and had a gale from the NE. obliging her to lie to, at 11 A. M. on the 29th.

\* The account it will be noted is a very loose one.

We have no data for assigning any centre to this storm on the 28th, if indeed it was formed at this time, but we can only conjecture it to have been, if formed, to the North and NE. of her on that day. On the 29th, however, we may fairly say that her NNE. and NE. gale was part of a true vortex, and that the centre bore about SEbE. from her. We can only estimate, or suppose, a distance for it, and this a very limited one, for if a vortex of large extent it would interfere with the Storm Circle of the *Caledonia*. That it was not a part of the *Caledonia's* storm, I infer from the fact that the distance between the two ships (both their positions being well ascertained) is upwards of two degrees, and their difference of longitude very small; so that the NE. gale of the *Juliana* cannot be made part of the *Caledonia's* circle, without carrying this last to reach the *John Wickliffe's* track, and include her on the 30th, when she had fine weather and calms.

On this account then I have marked the *Juliana's* storm for this day, as a separate one, also of small extent.

On the 30th we have the *Juliana* with an Easterly gale moderating at noon, while the *Morley*, to the ENE. of her, has hers just beginning at SSW. and was undoubtedly running on to the WNW., being bound to Madras, so as to overtake the more central parts of the storm which gave her the shift of wind to the Eastward, and the half an inch fall in her barometer. We have unfortunately here again but a meagre memorandum, in which the position of the ship for the 29th and 1st are wanting, when these would have been of the greatest importance to our research.

Of the *Myaram Dyaram's* hurricane, all we know is, that she had the wind more Easterly than the *Caledonia*, and occasionally to the North of East.\* We know so little as to date and her position, that we are compelled, merely to *suppose* that it was on this day she had it most severely, and was in distress; one account (Captain Faucon) saying it was on the 1st, and another (Captain Twynham) on "the same day as the *Caledonia*," which would be the 30th, and her position gives the greatest probability to its having been on the 30th.† I have therefore placed the

\* Letter from Captain Twynham.

† Captain Twynham, and Captain Faucon both mention that the *Myaram Dyaram*, "a short time" or "a few days" before the gale fell in with a vessel from Moulmein.

centre of this storm for this day close to the Southward of the *Myaram Dyaram*, and have just included in it the position of the *Frances*, which ship was evidently on the Southern and S.Eastern verge of a storm, and as far as we can judge by her meagre note, ran up on its Eastern side. It will be noted also that her position on this day with a Westerly and S.Westerly gale reduces greatly the Storm Circle of the *Caledonia*, proving that it could not even have been of 100 miles in diameter.\* The fact of two small vortices so nearly parallel to each other is very remarkable, but the evidence for it appears to me, on this day especially, to be unquestionable, and if the *Myaram Dyaram's* storm commenced on the 28th, the two storms may have been also both formed on that date.

We have no farther trace of this storm after the 30th, and thus are uncertain if it broke up or amalgamated with the *Caledonia's*, *Hindoo-stan's*, and Ceylon storm, or if it continued its track farther as a small independent storm to the Coromandel coast, and crossing the Peninsula, forced its way through the Palgatcherry Pass, and produced the Cananore, *Rajasthan's*, or *Monarch's* storms in the Arabian sea?

We can only intimate, or consider that this might be possible, and the heavy storm at Ootacamund, which is twenty-seven miles North of the Palgatcherry Pass, and nearly three degrees North of the centre of the storm we have traced near Cape Comorin, lends some countenance to this view; for a small storm might easily have landed about Porto Novo, between Pondicherry and Point Calymere without any reports or accounts of it being taken or obtained. The threatening weather seen to the SE. from Madras *might* have been the outskirts of it.

We now return to the Arabian Sea. I have shown at p. 911 that the *Charles Forbes'* storm may have been broken up amongst the Laccadives, or it may have joined its force to that of the Cananore storm, and both together have formed that which the *Rajasthan* experienced from the 4th to the 6th. We have seen that at noon the *Charles*

in distress, having no one to navigate her on board, and that she assisted her with an Officer and two Lascars. On her arrival at Point de Galle, two days after the *Myaram Dyaram*, it was found that she had fallen astern, and to the Northward of the *Myaram*, and though she felt the sea, had no violent winds. Her position being quite uncertain, we can only notice this.

\* The *Caledonia* might even on this day have been further to the Northward, as she found on the 2nd that she was 50' North of account.

*Forbes'* storm was clear of the coast, and that at Cananore it was a gale on the 3rd, from 8 A. M. to 1 P. M. from NE., East, and SE., and that the ship *Charlotte* had no bad weather on the coast, being between Cochin and Cananore till the 4th; showing that this Cananore storm was of very small extent, and that the Cochin storm also did not reach much beyond that latitude. It is therefore *more* probable if the *Rajasthan's* storm came from the coast, that it was the *Charles Forbes'* travelling up in a NW. direction. Of the probability of this as to time and distance, we shall be better able to judge, when we have fixed the position of the *Rajasthan's* storm. That of the *Monarch*, which Captain Stewart supposes to have been the same, was evidently a different one, *preceding* that of the *Rajasthan* by fully eighteen hours.

It appears that on the 4th at 4 P. M., Captain Stewart observed a sudden fall of the barometer and sympiesometer, and that by noon of the 5th, the wind had increased to such a degree from the NW. that he judged it prudent to heave to, considering himself, as he observes in his note, in the South-western quadrant of a circular storm, which he no doubt was, and, from the sudden shifts, not far from the centre. I have therefore assigned it a circle of eighty miles in diameter only, which will allow her to have been twenty-five miles from the centre at noon, and in so small a vortex this seems quite a sufficient allowance. I am indeed inclined to consider this storm as one which was of much greater extent above, than at the earth's surface, thus affecting the barometer from 4 P. M. of the 4th; but not of any great violence, since the ship was running on, though her Captain clearly understood his position, till 6 A. M. The circumstance of the barometer remaining so low, with gusts at times though the force of the wind had, as it proved, passed over, is an additional motive for our supposing that the vortex may have been of much greater extent above.

The *Monarch's* hurricane as I have remarked, was evidently earlier in time, though this ship was considerably to the N. Westward of the *Rajasthan*.

It is remarkable that the *Monarch* seems to have seen the vortex spreading overhead at 10 P. M. on the 3rd, when her sympiesometer began to fall, and in three hours by 1 A. M. on the 4th, she had it blowing a complete hurricane, and at noon on that day she was at the centre of it. She laid to till 8 A. M. of the morning of the 5th, (the day of the *Rajasthan's*

or Cananore storm it will be remembered,) and then gradually made sail with the returning fine weather.

We can by no means positively connect these storms with those of the coast, though there is nothing impossible in their being connected, for taking the *Monarch's* to have been the Cananore storm, it must have travelled about 380 miles, or sixteen miles an hour, in the twenty-four hours between the 3rd and 4th, a rate at which no doubt our storms frequently *do* travel, and its rapid approach to the ship shews that it really was moving fast. It did not quit her so soon as it might be expected it would do, because she was for a time apparently blown round the circle, and thus drifting with the storm.

The *Rajasthan's* storm may be supposed to have been that of the *Charles Forbes*, without assuming any high rate of motion, for, as we have shewn, that vortex was just clearing, or clear of, the land by noon on the 3rd, when it would require only to travel about 300 miles in two days, or 150 miles per day, or a little more than six miles per hour to reach the *Rajasthan*.

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### Conclusion.

We are much struck when considering these remarkable small storms with their close analogy to what we see of water-spouts at sea, and with dust-whirlwinds on shore, which so frequently seem to move on in pairs or threes along the same paths: and yet withal, diminutive as we may comparatively term them, they seem to have been, for the *Myaram Dyaram*, *Caledonia*, *Hindoostan*, and the unfortunate station of *Baticolo* on the East side of the Peninsula, as well as with the *Monarch*, and nearly with the *Rajasthan*, of true hurricane, or rather considering them as to size, *Tornado* violence. They thus become, from the short warning which they afford, even more dangerous than storms of greater extent, which allow of twelve to twenty-four hours for preparation; and while they add a new page\* to our

\* Though not wholly an unexpected one. See X. Memoir. The *Coringa Packet's* and H. M. S. *Centurion's* storms off Ceylon; Journal Asiatic Society, Vol. XIII p. 113.

knowledge of Indian hurricanes, they give, as every successive investigation seems to give, a new lesson to the seaman which he has only to profit by.

The regularity with which, in spite of the mountains of Ceylon and of Southern India, they seem to move on, in about the average track is also remarkable.

POSTSCRIPT.—While this paper is going through the press, I obtain the log of the Barque *Victoria*, Captain Hyde, which ship on her voyage from Calcutta to Bombay, had from 11 P. M. of the 2nd, and morning of the 3rd December, a heavy gale from the North to NW. and SW., but which abated by 9 A. M. At 6 P. M. of the 2nd Quilon Flag-Staff bore N $\frac{1}{2}$ W.; and at noon on the 3rd, the latitude was 8° 31' North, by observation. This ship was therefore a little to the north of the *Charles Forbes*' position, and proves our estimation of that storm as marked by the outer arrow to be correct.—H. P.

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